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137 NO. 12 OCTOBER 31 1959 Price 1s. Weekly

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Rubber and International Plastics Journal

Volnme 137 **Price 1s. Post free 1s. 4d.** **No. 12**

IN ITS 76th YEAR

October 31 1959

Editorial

NOTES OF THE WEEK 509

Articles and News

PATTERN-MAKING IN PLASTICS 511
DUSSELDORF EXHIBITION 513
COPPER IN HYDRAULIC BRAKE FLUID 516
VULCANIZING STOCKS 517
PLASTICS INSTITUTE CONVERSAZIONE 525
J. STOPFORTH 526
FBRAM GOLF COMPETITION 528
THE ENIGMA OF MR BANBURY 530

Features

VIEWS AND REVIEWS 520
QUESTIONS CORNER 522
MEN AND MATTERS 524
RUBBER AND PLASTICS NEWS 532
RUBBER STATISTICS 534
PATENT SPECIFICATIONS 535
PLANTATION SHARE SURVEY 536
RUBBER MARKETS 537
INDUSTRY INTELLIGENCE 538

Classified Advertisements . . . 540 Advertisers Index . . . 544

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Grams: 'Buns, Souphone, London' Phone: HOP 5712
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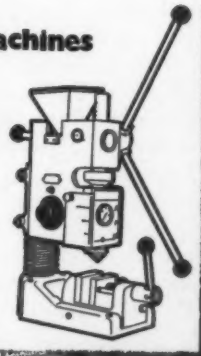

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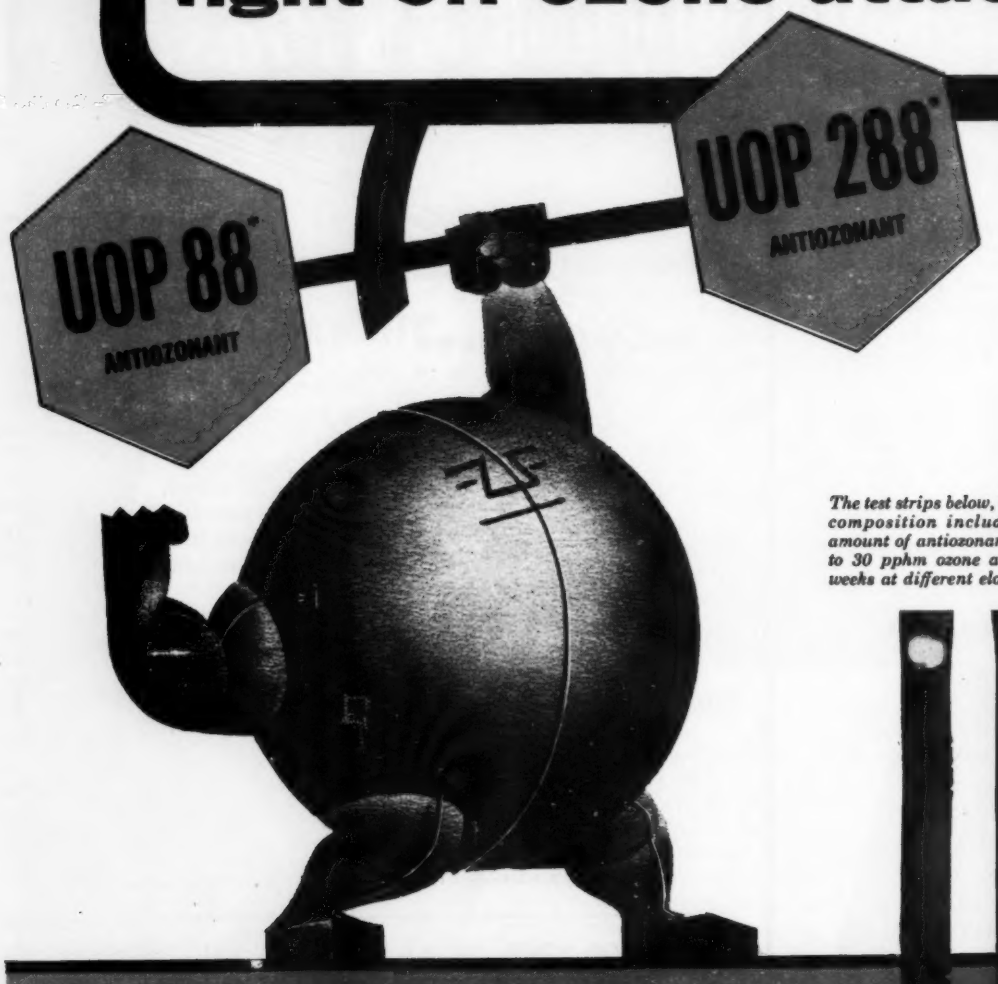

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NOTES of the WEEK

Dusseldorf

IN retrospect the plastics exhibition at Dusseldorf, 'Kunststoffe 59', can be described without reserve as a very great success. To those who attempted anything like complete coverage, a more meaningful adjective would perhaps be 'formidable.' Seven large halls, some of them with three and four floors, were filled with practically everything connected with the plastics industry. On any basis, the exhibition was around three times as large as that held in London last June but, even so, there is already talk of the site being too small for the next. Attendances were high even on the more expensive days—practically solid on the cheaper ones—and from all reports, with regard to business done, it was a real trade fair. Likewise, the enormous public attendance meant that the occasion provided excellent publicity for the industry. From this point of view, at least, the extent of the participation by British companies in this most important exhibition was disappointing. The effort and drive—and, in the event, excellent organization—put in by the British Plastics Federation to bring into being, with the whole-hearted co-operation of the Board of Trade, the combined British stand, should have been better supported by member companies. Nothing less than an entire floor should be the aim next time. Those British companies which had separate stands put up a good show with exhibits of high standard and effectively designed stands. Although it is perhaps invidious to single out any, the stands of Imperial Chemical Industries, Peco, R. H. Windsor, B.I.P. Chemicals and the London and Scandinavian Metallurgical Co., Fawcett Preston and Co., Hunt and Mitton, Wiggins Teape and Commercial Plastics, who were also on the combined British stand, deserve special mention.

London Exhibition Centre

IT was most interesting to read in Dusseldorf of the report by a committee of the Federation of British Industries urging that a £10m exhibition centre should be built in central London. Such a move has been several times advocated in these columns. The committee's main conclusion is that an exhibition building is needed urgently in central London having at least 500,000 sq. ft. of space on the ground floor. It should have accommodation on upper floors for offices, restaurants, conference rooms and other amenities. We are in wholehearted agreement with the committee's statement that 'immediate steps' should be taken by the Government to draw up plans for the centre 'on bold and imaginative lines' and to seek a site for it. The co-operation of industry and other interested parties should be sought. In a letter to Mr Maudling, President of the Board of Trade, Mr McFadzean, FBI president, says the Federation is against recommending projects involving assistance from public funds. 'This project is, however, exceptional. In the first place, we are convinced that trade fairs will play an increasingly important part in the promotion of our export trade in the coming years, and that recent developments in Europe will make it even more imperative than now that we should increase still further our own exports, especially to Europe itself.' The FBI committee makes five supplementary recommendations to help arouse public interest in London trade fairs—incidentally a very notable feature of Continental, and especially German, trade fairs. One of these advocates recognition by the Government that specialized trade fairs are a vital part of the country's industrial life and that, when they have an important bearing on exports, they should be accorded the national prestige formerly given to the British Industries Fair. The need for such a centre has been apparent for a long time. It might also be a good idea, in the writer's opinion, to examine the possibility of a South Bank site, with a riverside frontage.

Peace and Quiet

AT a meeting of the Noise Abatement Society (which must certainly have a lot of work these days) reported in *The Times* recently, the suggestion was made that rubber dust-bin lids should be obtained to fit the ordinary galvanized dust-bin. One of the members mentioned a local regulation in Paris to the effect that everyone must have a quiet dust-bin. He said that heavy rubber lids could be bought for the price of galvanized lids. It seems a pity to stop at lids. The dust-bins themselves are responsible for as much noise, if not more, than the lids. Admittedly this is less frequent, but at the same time it would seem to be a very good idea for councils to go the whole hog and have rubber dust-bins as well as rubber lids.

Vehicle Security

AN interesting survey of the pattern of thefts from goods vehicles has been made by the Road Haulage Association. The main conclusion is that two-thirds of the total number of thefts occur in the London area. There are some interesting facts, too, about security devices. These apparently have a remarkable effect and are obviously well worth fitting. Among operators' experiences quoted is that of a fleet owner who has had recently only five cases of theft from his own vehicles but 450 in the same period from sub-contractors' vehicles not protected, and he subcontracts only a small proportion of his traffic.

NEWS *Briefs*

US POLYSTYRENE PRICES — DANISH IMPORTS
PLANTATION WAGES—WEST GERMAN PLASTICS
TYRE FACTORY FOR KERALA — GREEK PROJECT

●**United States**—A general price reduction for medium and high impact polystyrene has been initiated by Dow Chemical Company. The reductions range from 2½ cents per lb. on three grades of high impact polystyrene to one cent per lb. for medium and super impact styrene. Dow reports that volume purchasing with resultant production savings has made these reductions possible. Monsanto Chemicals and the Koppers Company have also revealed that their medium and high impact grades will be priced in line with Dow's. Another major producer, Bakelite, says that 'it will remain competitive.'

●**Denmark** — Danish imports of natural rubber during August totalled 554 tons compared with 517 tons in July and 760 tons in August of 1958, according to the Department of Statistics. August imports included 257 tons from Malaya, 86 tons from Nigeria, 64 tons from the Belgian Congo and 55 tons from Indonesia. Imports of synthetic rubber totalled 312 tons against 176 and 86 tons respectively. The two main suppliers were the United States with 159 tons and Canada with 111 tons. West Germany delivered 21 tons.

●**Switzerland**—Swiss rubber imports (including waste) in September totalled 1,286.9 metric tons compared with 554 tons in August and 1,001 tons in September 1958, according to the Swiss Customs Directorate. Main sources of supply in September were the US with 636.8 tons, Malaya with 369.7 tons, West Germany with 77 tons, and Canada with 126 tons. Swiss imports of rubber in the form of sheets, strips, balls, etc. (without fabrics or metal parts attached) totalled 104.4 metric tons against 107 tons in August and 88 tons in September 1958. Imports included 64 tons from West Germany, 3 tons from Malaya, 9 tons from France and 8 tons from Belgium.

●**Malaya** — Representatives of the National Union of Plantation Workers and the Malayan Planting Industries Employers' Association are meeting this week to discuss the current wage agreement, Union sources report from Kuala Lumpur. The agreement came into force on June 1 this year. The Union wishes to discuss a number of matters arising from it, according to officials. These included payment for days not worked because of rain, tapping in difficult country and the division of estates into three categories.

●**United States**—Montecatini Chemical Co. has announced that Novamont Corporation, an American unit of the parent Italian firm, will more than double the production capacity of its polypropylene plastic plant at Neal, West Virginia, scheduled to start up early in 1961. Capacity will be increased to 25,000,000lb. a year. When the plant was announced last summer, its capacity was set at a little more than 11,000,000lb. a year.

●**Western Germany**—West Germany is expected to produce about 800,000 tons of plastic materials this year, Dr W. Mauss, chairman of the Association of Plastic Materials Producers, said at a Press conference in Düsseldorf on October 16. Production in West Germany had more than doubled since 1955, he added. Consumption last year, at more than 10 kilos per head of the population, was similar to that of the United States.

●**Ghana** — Ghana is to intensify its development plan for a rubber growing industry. From its office in Accra, Barclays Bank DCO reports that the Department of Food and Agriculture is concentrating on the development of the rubber industry during the second five-year development plan. A subsidy of £30 will be granted to every farmer who is able to cultivate one acre of rubber plantation in Ghana. The Bank report adds that it is expected that rubber experts will shortly carry out a survey for the implementation of the rubber industry and seeds will be distributed to farmers for growing in fertile areas.

●**India**—Kerala will soon have a rubber tyre factory, to be set up in the private sector by an Indian firm in collaboration with an American company, according to the Indian Statesman. The capital investment is to be 20 million rupees, of which the State Government will take shares worth 5 million rupees. A representative of Dayton Rubber Company, of America, which will provide technical assistance for the project will help to select a suitable site.

●**Greece**—Societa per Azioni Pirelli has announced that the Greek Government has authorized the building of a pneumatic tyre factory by a group comprising Société Internationale Pirelli, of Basle, the Ethel Company, of Athens, and several Greek businessmen.

'Care for a little bet on the sectional accuracy of the formed corners?'—456

Pattern-Making in Plastics

3. GLASS-FIBRE LAMINATES

(Continued from October 24 issue, page 484)

By H. G. KING

Summary

The introduction of plastics as a material for the manufacture of foundry patterns has opened a wide field for interesting development. For the past three years the possibilities of using this type of pattern in the iron, steel, and brass foundries have been investigated and developed in the Crewe Locomotive Works, by the author. After initial difficulties and trials with various types of resins and materials, the use of plastics has increased with such outstanding success, in both the pattern shop and the foundries, that pattern-making in plastics has been established and is now a recognized method of manufacture. As a result of the research into the use of this material, there are now over two thousand plastic patterns in use on moulding machines of various types, and these notes are illustrating the advantages that have been found to accrue from this comparatively new practice. The resins used in the manufacture of the patterns considered in this paper are the product of one particular firm; the formulas quoted are peculiar to these products and are not of a universal nature.

WITH the introduction of fibreglass laminates to this type of work it is difficult to visualize the limit of dimensional development in the use of plastics for pattern-making. Laminated patterns possess immense strength, are very light, and maintain the high quality finish associated with plastics. The process of producing a laminated pattern is, in brief, to cover the mould face with a special facing mix and build on to this layers of impregnated fibreglass material. It will be appreciated that a thin facing mix will need to hold without flow on all surfaces including the vertical, and therefore, must be fully thixotropic.

Two formulae are available for producing this facing coat, firstly the thixotropic agent can be added to a casting mix, secondly the new thixotropic resin in paste form can be used, and, although this method is much preferred to the former, I propose to give both formulae. First the use of the thixotropic agent the initial formula being: Epoxy resin—100 parts; hardener modifier (medium speed)—65 parts; filler–marble flour —60 parts.

Thorough mixing of these ingredients is followed by the addition of the thixotropic agent. About six parts by weight is usually sufficient, but it is essential that the mix does not show any sign of flow, and this condition should be obtained regardless of the amount used. The addition of the thixotropic agent should be very gradual, and after a time it will be found difficult to mix in a container, and from this stage mixing should continue on a board with the aid of two spatulas. The mix can be considered fully thixotropic when it will not fall or flow from the spatula, and the resin on the board will maintain shape without movement.

Secondly, the use of the prepared thixotropic resin and the formula for this is much more easily mixed: Thixotropic resin paste—100 parts; hardener modifier (medium speed)—65 parts; filler–marble flour—60 parts.

The thixotropic paste and hardening agent are first very thoroughly mixed and the filler added, and the mix is ready for use.

As some time has been spent preparing these mixes, particularly the former, the use of this facing coat should not be delayed.

Fig. 9 illustrates application of a facing coat to a mould for a 4ft. diameter locomotive wheel pattern.

Using a palette knife or spatula the mix is spread over the mould surface to a thickness of about $\frac{1}{16}$in. Some difficulty may be experienced in securing uniform thickness over uneven surfaces in which case tools of the type used by moulders for facing sand mould will be found useful.

The mould covered in this way should stand in room temperature for about two hours, or until the surface is becoming firm yet remains tacky, and this condition is ideal for the application of the fibreglass laminates. Several fibreglass materials are available but of outstanding merit for this type of work is a fabric of loose weave, about 10 thou. thickness.

The mix for impregnating the fabric can now be prepared: Epoxy resin—100 parts; hardener modifier (medium speed)—65 parts; filler-marble flour—20 parts.

The fabric should be applied in small pieces with wall overlapped joints and Fig. 10 illustrates the process. It will be found difficult to impregnate small pieces individually, owing to the loose weave of the material and the tendency to fray, and the following method is recommended.

Thinly spread some of the impregnating mix on to a board and lay over this a fairly large piece of fabric, using a rubber roller (one about one inch diameter, four to six inches long will be suitable) roll the fabric until the mix penetrates and this will give excellent impregnation, and pieces of any size and shape can be cut without any tendency to fraying or destroying the weave of the material. The entire surface of the faced mould is now lined with fabric, carefully pressed and rolled to exclude air, and ensure full adhesion, and for this operation a special tool known as a split washer

Fig. 9. Application of a facing coat to a mould for a 4ft. dia. locomotive wheel pattern

roller is available. Two layers of fabric applied in this way will be sufficient for medium sized patterns, but for large work one thickness of fabric, one of mechanically bound fibreglass matting, and, finally another fabric will produce a pattern of incredible strength.

Fig. 10. Fabric being applied to the mould in small pieces with wall overlapping joints

To facilitate the assembly of the pattern to a machine plate, pockets of plastic material are formed at selected positions by surrounding small wooden blocks with impregnated fabric, and, when the fabric is sufficiently firm to maintain shape without support, the blocks are removed and the cavities filled with a casting mix.

The thickness of the top edge of the cast can be increased to give additional rigidity and a more solid face for machining by spreading a thixotropic mix over this area, or, laminating can be continued around the edge in ribbon form.

Fig. 11. Reinforcement of a cylinder cover pattern

Reinforced Fibreglass Laminates

Many forms of reinforcement can be applied to laminated patterns and the use of the vermiculite mix for the purpose has proved very satisfactory, giving lightness together with sufficient strength to give the desired rigidity. The design of reinforcement will, of course, depend on the shape and size of the pattern, but the main forms will be surface reinforcement, or ribbing, or, in some cases, a combination of both. Surface reinforcement can be achieved by lining the laminated area with a vermiculite mix held in position during the period of gellation by plywood or thin timber shuttering. Reinforcing ribs can be cut from pre-cast slabs of the vermiculite mix about one inch thick, and this material can be roughly cut to the required shape on a wood cutting band-saw, and built into the pattern by using a thixotropic mix as an adhesive. For smaller patterns, it may be considered economical to reduce the number of laminations to a minimum and fill the entire centre with a vermiculite mix. In every case, reinforcements should be completed before the pattern is removed from the mould and the normal heat treatment applied.

Fig. 11 illustrates the reinforcement of a cylinder cover pattern, the top edge has been reinforced with a vermiculite mix, and four vermiculite ribs are being fixed in position using a thixotropic facing mix as an adhesive. Economy in the use of this vermiculite mix may be achieved by embedding pieces of cork in the vermiculite, and Fig. 12 illustrates the same 4ft. diameter wheel pattern being reinforced with vermiculite which includes blocks of solid cork.

Fig. 12. Four-foot wheel pattern being reinforced with vermiculite which includes blocks of solid cork

(To be concluded)

Union Carbide Research

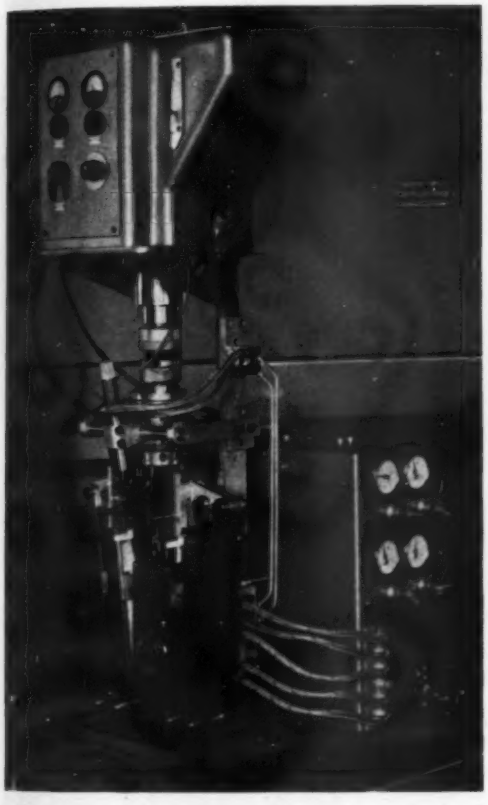
Construction is to commence on the building to house the Union Carbide Research Institute, a special research activity of Union Carbide Corporation, it was recently announced by Morse G. Dial, chairman of the board and chief executive officer. The building will be located at Union Carbide's Westchester County 280-acre (113.4 hectares) property at Eastview, near Tarrytown, New York. It will be completed and ready for occupancy the latter part of 1960. On the same site a technical service laboratory for chemicals is nearing completion.

Union Carbide Research Institute was formed in 1956 in order to complement and extend the scope of the basic research being carried on in Union Carbide's research laboratories. Programmes already under way or in the planning stage include such areas of study as solid-state physics, the theory of metal bonds, and the structure of plastics.

Dusseldorf Exhibition

BIG AND BUSY

WHILE comprehensive reports of 'Kunststoffe 59,' the Düsseldorf Plastics Exhibition, which closed on October 25, will appear in succeeding issues of the Journal, preliminary impressions are that it was very much better attended than either the London or the Paris exhibitions held earlier this year. It was also much larger. The concensus of opinion was that a great deal of business had been done and that over and above that there had been overall a high number of serious enquiries. Certainly there were no complaints from those who exhibited on the combined British stand; it being generally agreed that interest had been high, in some cases to the expressed surprise of those exhibiting, and that the venture was well worth while.



This machine by Alpine AG, Augsburg, blows small bottles at the rate of 70 an hour. It is self-contained and completely automatic

Machinery

On the machinery side, which covered 30% of the available floor space, there were some interesting and promising developments which will be described in detail in later issues. Notably, these included machines on the Alpine stand, in particular the high-speed extruder with a screw diameter of 35mm. and a continuous controlled feed; an interesting degasifier on a Troester machine and a Frieseke and Hoepfner extruder with a screw ratio of 3½:1. An extruder, on the Johann Fischer stand, equipped with a twin head which can blow two different thicknesses of film at the same time, was likewise interesting, as was the screw plasticizer injection moulder shown by Krauss Maffei which has a shot capacity of 4½kg.

An automatic gramophone record press was shown by Werner and Pfleiderer together with other machines including a heavy duty mixer with a very high capacity. A 60-strand chip cutting machine with an output of 2 tons an hour, was among the Fellner and Ziegler exhibits and a 100 strand (at 2mm. diameter) on the Automatik stand. Mapré showed for the first time two twin screw models, the 64 and the 102mm., also an interesting swing saw machine for cutting pipe and tube.

The Haynes and Haynes tube thickness gauge, on the Johann Fischer stand, virtually a new machine, was shown with a new feature, electronic control of the extruder from the calibrating device. Another machine that attracted a great deal of attention was the rotary automatic injection moulding machine type P15, and its larger brother the P50 displayed and demonstrated on the Nothelfer und Söhne stand. The P15, with an injection capacity of 15 grammes, uses six similar or different moulds. The elimination of cooling time enables the machine to produce at up to 34 shots per minute. A single-screw preplasticizing unit is used.

Materials

With regard to materials, there was rather less on polypropylene than many had expected and disappointingly little on polycarbonates. Various polyamides were quite extensively shown with some interesting uses including rail-linking plates. Chemical plant fabricated from PVC and polythene was fairly widely displayed and it was notable that the quality of workmanship was high. Interesting were moulded polythene impellers and press formed PVC impellers up to 12in. Extruded rigid PVC tube of 20in. diameter, produced on a

The plastics rain and other wear, such as this cape in clear PVC, shown by Commercial Plastics Ltd., 75 Grosvenor Street, London, W.1, at Dusseldorf, created something of a sensation by their colour and variety of design

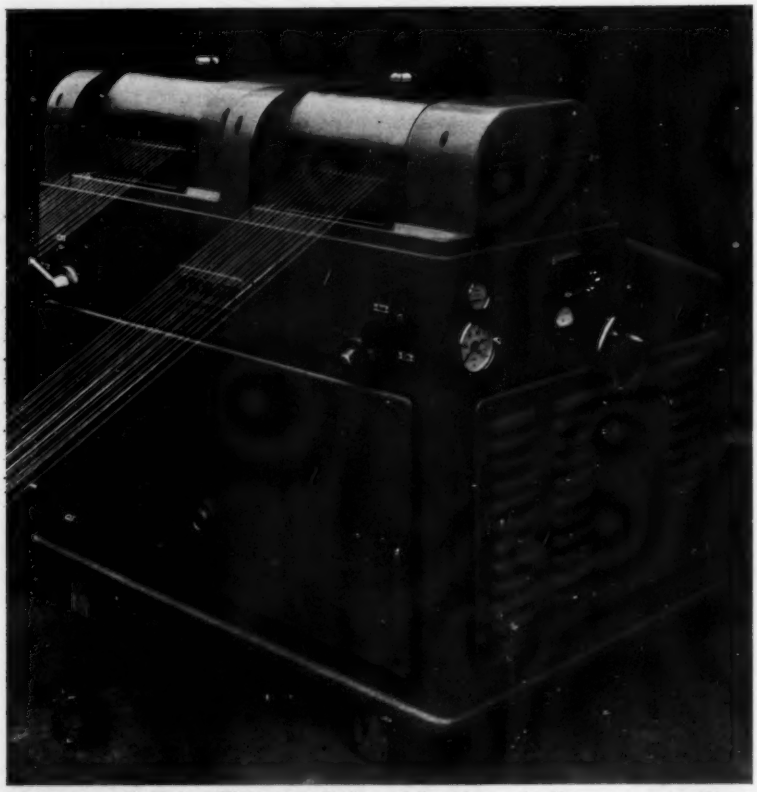
Pasqueti machine, was the largest extruded tube on show. At the other end of the scale, Portex PVC medical grade on the Portland Plastics stand proved of interest to many visitors.

In pipes and tube, there were many examples of compression joints incorporating rubber rings. PVC is still used much more for pipes than is polythene on the Continent, although there was an impressive display of the latter on the Mannesmann-Plastic stand. In this connexion, it is interesting to record the large number of visitors to the stand of Durapipe and Fittings Ltd., which would perhaps indicate that Continental manufacturers are not entirely convinced compression joints are satisfactory. There were also a large number of moulded fittings in polythene with an electrode moulded in.

The wide range of corrugated continuous rolls in polyester glass fibre is an indication that this method of production offers many advantages from production as well as the sales point of view.

A considerable amount of stand space was devoted to wide ranging displays of the domestic uses of many different types of plastics. These included complete shower bath cabinets, shutters in many sizes and colours, window frames—designed on quite a different principle from those illustrated in *RJIP*, October 17—and cups, saucers, plates, jugs, etc., right through the range. Among the most effective domestic uses shown were the cups in two colours included on the BIP Chemicals stand. This was similar to that at the company's stand at Olympia, and comprised an effective exhibition in little of mouldings from all over the world of an exceptionally high standard.

The exhibition, of course, was so all-embracing that there is not sufficient space in a single issue to report anything like all of it. Detailed reports of outstanding features will appear in later issues of *RJIP*.



Cutting machines handling strands from 1.5 to 4mm. in diameter were shown by Automatik, of Aschaffenburg. The model illustrated, FKS 25 Duo, will process 100 strands up to 2mm. in diameter, 80 of up to 3mm. diameter and 60 of up to 4mm. The feed rate is infinitely variable within a wide range

Dusseldorf Attendance

At the time of going to press it is reported that the number of people from foreign countries all over the world that visited the Düsseldorf Plastics Exhibition exceeded 330,000.

It is estimated that the value of orders booked directly at the exhibition by machinery manufacturers will reach a total of at least DM50m.

IRI News

Southern Section

The Southern Section of the Institution of the Rubber Industry held its annual joint meeting with the West of England Section on Wednesday October 14 1959, when members met at the Red Lion Hotel, Salisbury.

After a buffet supper, the chairman of the Southern Section, Mr D. S. White, introduced the speaker, Dr G. F. Bloomfield, of the British Rubber Producers' Research Association, who gave a lecture entitled 'Recent Developments in the Malayan Rubber Industry.'

Leicester Section

Mr C. E. Webb, Research Manager of Pussyfoot Products, C. and J. Clark and Co., Ltd., Street, Somerset, was to have given a lecture entitled 'Developments in the Technology of Direct Moulded Footwear Processes,' on Friday October 16. Unfortunately, Mr Webb met with a car accident when approaching Leicester on Thursday and was admitted to the Leicester Royal Infirmary with a fractured leg and head injuries. He is making a good recovery, having been moved to a hospital near his home.

Stepping into the breach, Mr H. H. Clarkson, sales manager of Pussyfoot Products, was able to read Mr Webb's paper, performing the very difficult task admirably, including the answering of a number of questions. The paper, which was full of technical details, will, it is hoped, be published by the Institution. Mr Clarkson was able to distribute copies of tables and graphs which enabled the audience to follow the course of the lecture.

Mr J. C. Wright expressed the appreciation of the audience both for the interesting paper which Mr Webb had prepared, and for the efficient way Mr Clarkson had carried out a very difficult task.

Dr K. O. Lee, chairman, expressed the Leicester Section's hope that Mr Webb would make a speedy recovery.

It has been brought to our notice that in *RJIP* of May 23 1959, reporting the OCCA Conference — 'A Survey of Polymers,' we referred to a paper by Mr W. H. Stevens, the consultant, as being on Polysulphides and Coatings. The title should have read Polysulphide Coatings and Sealants. In the same context reference was made to 'thiokols' as a class of material. 'Thiokol' is, of course, a trade name of the Thiokol Chemical Corporation, USA.

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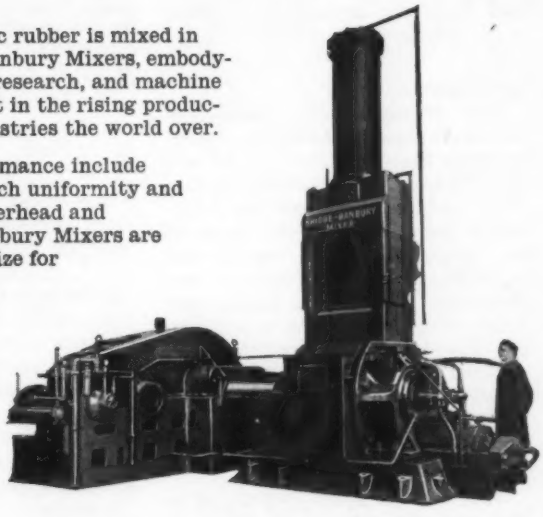

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Copper in Hydraulic Brake Fluid

THE EFFECT ON RUBBER CUPS

BY Z. RIGBI*

FOLLOWING a recent fatal motor-car accident in Israel the Laboratory of the Rubber Research Association at Haifa was requested to co-operate with the Israel Police in the investigation of the reason for the failure of the brakes, the immediate cause of the accident. It was found by the police investigators that one of the brake-cups had exploded, and although the general feel and appearance of the rubber indicated some deterioration, it was proved that the primary cause lay in mechanical maladjustments.

In the course of the investigation, however, considerable quantities of dissolved copper were found in the brake-fluid drained from the hydraulic system, and the following experiments were undertaken in order to determine in what way the dissolved copper is likely to affect the rubber. It was borne in mind that, as a result of friction on the drums, and poor cooling, the temperature of the brake-fluid could rise intermittently almost to the boiling point of water.

Specifications

The production of brake-fluid and brake-cups in Israel is covered by Israel Standards Nos. 47, 48 and 225. These are roughly modelled after corresponding SAE Standards. Limitations are placed on the attack of the hydraulic fluid on copper, and according to the conditions of test, dissolution of up to 17.5mg per 350ml of hydraulic fluid, *i.e.* 50ppm is allowed. In the corresponding standard for brake-cups, the presence of copper in the immersion hydraulic fluid is not required, and no consideration of its effects on the rubber is made.

The average brake system of a large passenger car contains 400ml. of brake fluid, and the average weight of rubber in the eight brake-cups is about 32gms. The brake system, being closed, therefore can bring over 600ppm of copper to the rubber in the brake cups.

* *Of the Rubber Research Association, Haifa, Israel. The details given in this article are published as a matter of general interest and have no bearing on the conclusions of Israel police investigations.*

Compounding

The base compound used in these tests was formulated as follows:

	768/1
Smoked sheets ..	100
Zinc oxide	5
Stearic acid	2
MT black	50
SRF black	40
DPG	0.4
MBTS	0.8
Sulphur	2.5

This compound was selected as being of the same hardness and having the same swelling properties in hydraulic oil, light petrol and aniline as a brake-cup of world-wide repute, but no claim is made that it is otherwise necessarily suitable for this application. Six other compounds were prepared, each containing added quantities of antioxidants as follows:

768	768/2	768/3	768/4	768/5	768/6	768/7
Base compound 768/1 ..	200.7	200.7	200.7	200.7	200.7	200.7
Nonox B (*a*)	1.0	—	—	—	0.6	1.0
Nonox CI (*b*)	—	1.0	—	—	—	—
Antioxidant 4010 (*c*) ..	—	—	1.0	—	—	—
Nonox DPPD (*d*)	—	—	—	1.0	—	—
Aranox (*e*)	—	—	—	—	0.4	—
Copper inhibitor 65 (*f*) ..	—	—	—	—	—	1.0

(*a*) Ketone-amine condensation product, I.C.I.
(*b*) Di - β-naphthyl-p - phenylene - diamine, I.C.I.
(*c*) N-phenyl-N-cyclohexyl-p - phenylene diamine, Bayer.
(*d*) Diphenyl-p-phenylenediamine, I.C.I.
(*e*) p - (p - toluene - sulfanylamido) - di - phenylamine, Naugatuck.
(*f*) Solution of disalicylal propylene diamine, Du Pont.

Heat resisting properties are claimed for all these protective products except Copper Inhibitor 65. In addition, all these products, with the exception of Nonox B are said to give good protection against copper 'poisoning.' Aranox and DPPD bloom when used in proportions greater than 0.4 phr, but as the bloom of the latter is quite slow, the full 1 phr was used in the hope that it would give added protection.

Tests

Throughout the tests, a single can of Shell Donax B Hydraulic Fluid was used; this is claimed to fulfil the requirements of Israel Standard 47, although the claim was not verified.

Dumb-bells (BS 903, type C, were used in stoppered boiling tubes throughout) were cut out of pressed sheets and immersed in the fluid in 35ml of fluid were used for each four dumb-bells, but as these varied somewhat in thickness, it cannot be assumed that strictly proportional quantities of fluid to rubber were used. Immersions were made in the fluid alone, and in fluid into which a clean piece of electrolytic copper wire, 1.2mms dia and 60 mms long, was placed.

In addition, similar immersions were made of Compound 768/1 in fluid into which 1% Nonox CI was dissolved.

The tubes were placed in an oven maintained at 90°C. for five days, and then allowed to cool at room temperature for one day. The dumb-bells were then rinsed in acetone, dried between filter paper and tested on the following day. These conditions are considerably more severe than called for in Israel Standard 225, in which immersion at 70°C. is required.

Results

The following values (p. 518) are based on the unstressed, swollen cross-sections. Analysis of the fluid in which 768/1 was heated together with the copper wire showed that 175ppm of copper had dissolved into the fluid.

Discussion

The following conclusions may be drawn from the above figures: 1. The unprotected compound suffers badly from immersion in the hydraulic fluid with or without the copper wire. The additional effect of the copper wire is definite, but small; 2. There is little difference between the protection afforded by Nonox B, Nonox CI and 4010, but Nonox CI is rather poorer than the other two; 3. Nonox DPPD gives reasonable

Continued on page 518

Vulcanizing Stocks*

SOME NEW MATERIALS

NEW types of useful materials—acetylene black, VSF-1 plasticizer, AB resin, Vulcacit-P-extra-N—and others which are widely used in mass-produced articles, have been studied and tested in the laboratory of the Kauchuk Works, Moscow.

Acetylene Black

This is used as a reinforcing filler. It considerably increases the tensile strength of vulcanizing stocks, raises their abrasion resistance and at the same time confers on the stocks good processing properties during calendering. For increasing strength and resistance to abrasion, acetylene black exceeds lamp black and atomizer (oil-based furnace) black, being second only to channel black; in its processing properties it is superior to the last-named.

The useful properties of acetylene black may be explained in part by its fine state of subdivision (particle diameter 40 to 45μm). The high oil index of 2.0 to 2.8 is evidence of the chain-type structure, which gives good electrical conductivity. Acetylene black is used in vulcanized rubber for the covering of conveyor belts of improved quality (mix 6023-6). The tensile strength of a mix containing 50% SKS-30 and acetylene black increases from 50-60 to 100-130 kg./sq.cm. The abrasion loss falls from 1,000-1,300 cu.cm./1kV h to 500-600.

FORMULA FOR MIX 6023-6

	Parts by Weight
SKS-30 (plasticity 0.3 to 0.4)	100.00
Sulphur	3.00
Altax	0.50
Thiuram	0.15
Zinc oxide	5.00
Neozone D	1.00
Acetylene black	60.00
Colophony	2.00
Rubrax	17.00
Stearine	1.35
Polydienes	10.00
	200.00

In order to attain the high abrasion resistanee, it is advisable to use the acetylene black in 50 to 60 parts by weight on the raw rubber (SKS-30 or natural rubber). As so far there is a lack of test specifications for acetylene black, a trial of the batches in hand is carried out according to GOST 7855-56 for channel gas black, and also according to the special formula '5RM-26' recommended by the Moscow Tyre Works. The cost of 1 ton of acetylene black is 2,100 roubles, that of gas black 2,640 roubles.

Renacit

In conjunction with the Nauchno-Issled. Inst. Rezin. Prom Renacit No. 4, Renacit No. 5 and Pepton-22 are plasticizers for natural rubber. The use of these products reduces the period of mastication of natural rubber in the internal mixer from the usual 10 to 12min. (with Captax) to 8 to 9min. (with Renacit 4). The most active plasticizer for natural rubber is Renacit 4 (the zinc salt of pentachlorothiophenol). Renacit 4 is non-toxic. When it is in the rubber it does not accelerate vulcanization, so that the use of Renacit does not alter the amount of accelerator required.

The optimum amount of Renacit 4 is established as 0.3 part by weight to 100 of natural rubber (in collaboration with the Nauchno-Issled. Inst. Rezin. Prom.). Renacit 5 (pentachlorothiophenol) and also Pepton 22 (ortho-orthó-dibenzamide-diphenyl disulphide) prove to be valuable plasticizers for natural rubber, but in their power of action are inferior to Renacit 4.

VSF-1 Plasticizer (a medium complex ester of higher alcohol fractions and orthophthalic acid)

The new softener and anti-freeze† VSF-1, tried out on a production scale in place of dibutyl phthalate, exhibits good properties. VSF-1, as an anti-freeze in the mix NO-68-2, used for tubular articles, differs only slightly from dibutyl phthalate and gives SKN and Nairit mixes frost resistance in the same range of temperatures as dibutyl phthalate, falling short of the latter by 1 to 2°.

The technological properties of spreading mixes, and also of mixes for the tubular outside layer of pressure-type and spiral hoses are completely satisfactory. We use VSF-1 in the same amounts as for dibutyl phthalate, mainly 20 to 30 parts by weight to 100 of the raw rubber. All the physico-mechanical properties of the mixes with VSF-1 remain at the same level as with dibutyl phthalate. The resistance of VSF-1 mixes to heat ageing at 100°, tested over the periods of two and six days, does not fall short of mixes with dibutyl phthalate. VSF-1 is produced by the Kuskovo chemical works to specification of the Kuskovo chemical works VTU No. 19-57. The cost of 1 ton VSF-1 is 12,600 roubles. The cost of 1 ton of dibutyl phthalate is 12,700 roubles.

We give below formulae for mixes for motor vehicle fitments and hoses using VSF-1:

FORMULA 4930-29 FOR PETROL-RESISTING SPIRAL HOSE

	Parts by Weight
Nitrit A	100.00
Captax	1.00
Whiting	64.00
Channel black	56.00
Thermal black	60.50
VSF-1	12.50
Vaseline oil	6.00
Stearine	6.00
Colophony	3.50
Industrial soap (*sic—no mention of sulphur*)	0.50
	310.00

FORMULA 4908-22 FOR CARDAN SHAFT COVERS

	Parts by Weight
Nairit grade A	95.00
SKS-30 (plasticity 0.3 to 0.4)	5.00
Zinc oxide	10.00
Magnesium oxide	5.00
Lamp black	33.00
Stearine	10.00
VSF-1	42.00
	200.00

AB Resin Plasticizer

AB resin, recommended by the raw materials department of the Nauchno-Issled. Inst. Rezin. Prom., has become popular as a substitute for dibutyl phthalate in mixes not requiring high frost resistance. AB resin is obtained by rectification of alkyl benzenes and is a viscous fluid of black colour (flash point (Brenken) 118 to 125°; Engler viscosity 1.6 to 2.5 at 50°).

AB resin allows of good mixing, gives high plasticity, the necessary

*By A. G. Blok'Kauch. i Rezina, 1958, 17 (4), 32-3). *Reprinted from translation No. 686 prepared by the Research Association of British Rubber Manufacturers.*

†*Translator's Note.—The use of the word anti-freeze may refer to effective low temperature plasticizer properties or may be an alternative word in Russian for plasticizer (Dibutyl phthalate is not normally claimed to have outstanding plasticizer properties at low temperatures). In the absence of confirmation of the translation of this word it is probably best to use the term anti-freeze.*

tackiness and adhesion to cotton fabrics. According to the data of the Nauchno-Issled. Inst. Rezin. Prom., and also of the 'Kauchuk' works, AB resin is not an anti-freeze. The large-scale production testing of AB resin was completely satisfactory and showed the possibility of using it in place of dibutyl phthalate in mixes based on Nairit for spreading on hose fabric (mix 4633-11), in a mix for 'skvidzh' (*Russian for 'squeegees'?*) of transmission belts (mix 6040) and in others.

FORMULA FOR MIX 6040

	Parts by Weight
Nairit grade A	100.00
Zinc oxide	1.00
Magnesium oxide	7.00
Lamp black	27.00
Atomizer black	24.00
Paraffin wax	7.00
Vaseline oil	3.50
Stearine	3.00
Industrial soap (*sic*)	1.00
	176.50

FORMULA FOR MIX 4633-10

	Parts by Weight
Nairit A	100.00
Thiuram	1.20
Neozone D	12.50
Zinc oxide	3.70
Magnesium oxide	12.30
Thermal black	18.80
Paraffin wax	2.50
Rubrax	18.70
AB resin	20.00
	250.00

The use of AB resin has great economic importance in mass-production. In mixes containing polydienes, these are easily replaced by AB resins in the proportion 1:1. The use of AB resin instead of polydienes was successful in the vulcanized rubber mix 4631 for the outer layer of pressure hose. In spreading mixes AB resin is used in amounts of 15 to 20 parts by weight.

AB resin is produced by the Grozny chemical works to the specification LU-84-56. The cost of 1 ton of dibutyl phthalate is 12,700 roubles. The cost of 1 ton of polydienes is 2410 roubles. That of 1 ton of AB resin is 290 roubles.

Vulkacit-P-extra-N (zinc salt of ethyl dithiocarbamic acid)

This vulcanization accelerator is widely used in articles for extrusion. It is a greyish powder with a melting point of 203 to 204°C. and sp. gr. 1.43 to 1.44, it dissolves readily in benzene, carbon disulphide, iso amyl alcohol and acetone. In mixes of natural rubber and in mixes based on SKN it considerably accelerates the process of vulcanization. 0.1% of it as an addition to the ordinary accelerator group in carbon black mixes of natural and nitrile rubbers (mixes 2462 and 4004) cuts down the time of cure of motor-car fittings from 20 to 25min. to 8 to 10min. at 150°C.

MIX 5-2462-5

	Parts by Weight
Plasticized natural rubber with 0.54% Captax	100.00
Sulphur	3.00
Captax	0.80
Vulkacit-P-extra-N	0.10
Neozone D	1.00
Zinc white	57.00
Lamp black	73.00
Stearine	1.20
Pine tar resin	2.00
	238.10

MIX 5-4004-12

	Parts by Weight
SKN-40	100.00
Sulphur	2.00
Altax	1.00
Vulkacit-P-extra-N	0.10
Zinc white	5.00
Colophony	8.00
Lamp black	100.00
Stearine	2.00
Dibutyl phthalate	4.00
	222.10

The ultra-accelerator and zinc oxide are used in the form of dibutyl phthalate pastes. The tensile strength and relative elongation of mix 5-2462-5 with added Vulkacit-P extra-N are just the same as with mixes with Captax (180-200 kg./sq.cm.) in tests made on vulcanizates of standard test-pieces (vulcanization 5min. at 150°). The coefficient of ageing measured from the relative elongations after a period of six days at 100°C. for a SKN mix (5-4004-12) with an addition of Vulkacit is 0.5 to 0.6., *i.e.*, the same as for Captax alone.

The optimum amounts of Vulkacit-P-extra-N accelerator in carbon black mixes of natural rubber and SKN may be reckoned at 0.1 to 0.3 parts by weight to 100 of rubber with amounts of 2 parts by weight to 1 part by weight of Altax in the mixes.

The cost of 1kg. of Vulkacit-P-extra-N is 18.94 roubles, that of thiuram 21.16 roubles.

No ultra-accelerator effect from Vulkacit-P-extra-N is observed with light-coloured carbon black-free mixes of natural rubber. Further study and experience with the new accelerator is of great importance for such mass-production articles as natural rubber conveyor belts, non-moulded sealing members, various types of hose, etc.

Copper in Hydraulic Brake Fluid

Continued from page 516

protection from the effects of the hot fluid, but does not protect as well as Nonox B, Nonox CI and 4010 in the presence of the copper wire; 4. Nonox B/Aranox and Copper Inhibitor 65/Nonox B show little protective value in hot fluid, both in the presence of copper and without it. However, copper reduces the mechanical value still further; 5. The presence of considerable quantities of Nonox CI in the fluid seems to affect the rubber adversely.

It would appear, from these results, that products which act as protective agents in air do not necessarily behave in the same way in hydraulic fluid. The lack of protection offered by Nonox B when mixed with Aranox and Copper Inhibitor 65 (both so-called copper deactivators) as compared with Nonox B alone, may indicate that, under the conditions of test, the copper sequestering properties can cause additional deterioration.

The above results, whatever else their merits may be, serve to show that the Israel specifications for hydraulic fluid and brake-cups (and specifications similar in context of other countries), have omitted consideration of an important factor, in view of the likely attack of copper from the transmission tubes on the brake-cups *via* the hydraulic fluid.

Properties (Modulus 200%, T.S., EB, H) after immersion in :

Compound No.	Hydraulic fluid				Hydraulic fluid + Cu wire				Hydraulic fluid + 1% Nonox CI				Hydraulic fluid + Cu wire + 1% CI			
	psi	psi	%	°iso	psi	psi	%	°iso	psi	psi	%	°iso	psi	psi	%	°iso
768/1 ..	350	825	235	48	435	750	285	45	200	450	260	48	220	400	270	43
768/2 ..	800	1300	250	47	665	1290	300	49								
768/3 ..	650	1225	255	52	650	1090	225	52								
768/4 ..	720	1335	290	45	650	1365	300	43								
768/5 ..	750	1135	260	45	650	900	240	47								
768/6 ..	575	775	270	43	200	400	240	36								
768/7 ..	550	660	260	44	350	460	260	43								
768/1— Original values	(Mod. 200%) 1190 psi				(T.S.) 2145 psi				(EB) 375%				(H) 72° iso			

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VIEWS and REVIEWS

Latest from Washington

A FURTHER batch of papers to be read at the Washington meeting (November 9–13) is presented by the *Rubber World* (p. 877). It is quite impossible to reproduce these here, but I hope that those interested will take the will for the deed. Reprints of all of the 75 papers will be available to registrants at the time of the Conference, and will represent the only publication of all of the complete papers at this time in one volume. Many of the papers may be published after the Conference in the journals of the sponsoring societies, but only individually or in small groups.

According to the *Rubber World* there is an advance registration at the Shoreham and Sheraton Park Hotels of more than 1,000 . . . the local committee . . . is anticipating a large attendance at the Conference. Actual pre-registration with the Conference Committee was less than 200 in mid-August, however, and more pre-registration would help the local committee greatly in reducing congested desks at the time of the meeting.

Testing Exhibits

The Conference Committee decided in late July that the exhibition of testing equipment at the Shoreham Hotel would be extended to include rubber products, chemical and compounding ingredients, and processing equipment and machinery. It is expected that an outstanding group of exhibits of *very great interest* to those visiting the Conference will develop. Interested exhibitors should contact Norman Bekkedahl, exhibit chairman, National Bureau of Standards, Washington 25, D.C., EMerson 2-4040, extension 7070.

The last group of abstracts, says *Rubber World*, will be published in the October issue together with a final corrected programme of all the papers to be presented, and other last-minute information.

Testing Tyres for Supersonic Aircraft

A new tyre tester which accelerates from zero to 300 miles per hour in 20 seconds, allows the Air Force to 'floorboard the pedal'—as *Rubber Age* of September 1959 (85, No. 6, p. 986) has it, in testing supersonic experimental tyres. Built by the Adamson United Co., of Akron, Ohio, for the Air Research and Development Command's Wright Development Centre, Dayton, O., the equipment is being used to study physical deterioration and heat fatigue encountered by tyres during high speed take-offs and landings.

The new facility is also designed to simulate landing deceleration. 'Where other tyre testing machines decelerate at 3 to 10ft. per second, the new machine decelerates from 300 mph to zero speed at 24ft. per second—or in 18 seconds.'

At the core of the machine is a 120in. flywheel which rotates up to 900 revolutions per minute simulating a ground roll of 300 miles per hour. Test tyres rolling against the flywheel undergo the same loads as are imposed by the aircraft. The testing facility is said to simulate take-off or landing conditions of any supersonic aircraft. An automatic pre-set programmer applies precise speeds and loads to duplicate the condition of any high-speed jet rolling down the runway. Many other particulars are given by *Rubber Age*.

The Shrinkage in Steam of Nylon 6.6

The fabric knitted from a thermoplastic yarn is commonly set to a desired shape and size by means of high-pressure steam.

The heat setting properties of thermoplastic yarns are, therefore, vitally important in the manufacture of textile garments made from these yarns, and a knowledge of the effect of these heat-setting treatments on yarn properties is essential. In a recent issue of the *Transactions of the Journal of the Textile Institute* (Vol. 50, No. 6, p. 393) there is a paper by D. L. Munde and D. Slater which describes the results of investigations on the effect of saturated steam on some properties of nylon 6.6 yarns. In particular the effect of the temperature and the strain on the yarn during previous thermal treatments on the irreversible free shrinkage in saturated steam is discussed in detail.

Mechanical Degradation of Polymers

In the series on 'Mastication of Rubber,' part VII is on the 'Mechanical Degradation of Polymers During Mastication,' the authors of which are R. J. Ceresa* and W. F. Watson† (BRPRA). This paper appeared originally in *The Journal of Applied Polymer Science* (Vol. 1, Issue No. 1, pages 101-106, 1959) and constitutes Publication No. 315 of the British Rubber Producers' Research Association.

Synopsis

The degradation on mastication of polymers brought into a rubbery state by incorporation of liquids or rise in temperature is accounted for by the mechanicochemical mechanism previously advanced to explain the degradation of rubbers. The dependence of the reaction on shear rate has been shown indirectly, as with rubbers, by the negative temperature coefficient of reaction, and also directly by the variation of rotor speed and design. A further new feature is the influence of the nature as well as concentration of plasticizer on the rate of degradation and a correlation with the softening of the polymer. A limiting molecular weight is reached on prolonged mastication from whatever initial molecular weight.

The Viscoelastic Behaviour of Rubber

Publication No. 316 of the British Rubber Producers' Research Association is on the 'Viscoelastic Behaviour of Rubber in Extension.' The author is P. Mason, and the

* Present address: National College of Rubber Technology.
† Present address: The Research Association of British Rubber Manufacturers.

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **DR SCHIDROWITZ**

paper originally appeared in the *Journal of Applied Polymer Science* (Vol. 1, Issue No. 1, pages 63 to 69, 1959).

Method and Results

Measurements of the (complex) dynamic Young's modulus of NR have been made by a wave propagation technique on filaments held at a mean extensions up to 600%. It is shown that the real and the imaginary parts vary with strain in the same way as the equilibrium modulus obtained from the 'static' stress-strain measurements, the behaviour up to about 140% extension being derivable from a Mooney-type stored energy function and at higher strains being dominated increasingly by the effects of finite extensibility in the network.

The viscoelastic behaviour up to about 140% strain may then be characterized by four parameters, of which one vanishes and another is constant for the rubber used. It is shown how these parameters may be used to derive the strain dependence of the damping or loss factor (*tan delta*) in this region. The effect of increasing extension upon the relaxation spectra, over the range of 100 to 600% extension, is to displace the whole spectrum progressively to longer times.

The Ageing of Thiuram Disulphide Vulcanizates

'The Ageing of Thiuram Disulphide Vulcanizates and Their Mechanism of Vulcanization,' is the title of a paper by J. R. Dunn and J. Scanlan (BRPRA), and forms Publication No. 317 of the British Rubber Producers' Research Association. It was originally published in the *Journal of Applied Polymer Science* (Vol. 1, Issue No. 1, pp. 84 to 90, 1959).

Tetraalkylthiuram disulphides, particularly the methyl and ethyl isomers, are well known as vulcanizing agents for NR, producing in the absence of sulphur, vulcanizates very resistant to high temperature oxidative degradation. It has recently been shown that this ageing resistance is largely due to the presence in the vulcanizate of zinc dialkyldithiocarbamates formed during the curing.

A systematic study has now been made of the extent of vulcanization of the effect of heat or ultraviolet light on thiuram vulcanized rubber and of the ageing behaviour of rubbers cross-linked by different tetraalkylthiuram disulphides in equimolecular proportions.

Method

Use was made of the technique of stress relaxation in which the decay during ageing of the tension in a strip held at constant extension is followed, the general nature of which is independent of the alkyl group. The ageing in air at 100°C. of fully-cured vulcanizates is excellent before acetone extraction but rapid after it, due to the removal of zinc dialkyldithiocarbamates, which are powerful antioxidants. In under-cured vulcanizates the network breakdown is much less than in fully-cured samples, and there is considerable cross-linking during the ageing.

This behaviour is attributed to a vulcanization intermediate which, at 100°C., brings about cross-linking with formation of zinc dialkyldithiocarbamate and which cannot be removed by acetone extraction. The presence of such an intermediate is confirmed by the ability of extracted under-cured thiuram vulcanizates to be further cross-linked in the press at 140°C.

The rapid initial relaxation of unextracted under-cured vulcanizates may be due to the breakdown of this vulcanization intermediate. During the thermal ageing of apparently fully-cured samples, some cross-linking occurs which is considered to be due to a direct oxidative reaction of dithiocarbamates. Unextracted thiuram vulcanizates degrade very little on illumination with ultraviolet light (wavelength 365 mμ), but after extraction the photolytic ageing becomes more rapid. There is no variation in the rate of this type of ageing with degree of cure, presumably because the vulcanization intermediate is light-stable.

Notes

Messrs Imperial Chemical Industries Ltd. have introduced Vulcafor Fast Green, 5GS, which is a new addition to their range of *Fast* colours for rubber. This pigment gives an intensely 'grass-green' hue, and in full shade it possesses very good fastness to light, water and solvent naphtha. On dilution of the pigment, the hue remains of a bright yellow green without acquiring undesirable 'sickliness' of appearance. Tests show it to be stable to most of the conditions of vulcanization obtaining in the rubber industry, and, being unaffected by the chemicals normally used for latex processes, it will also find many applications in that field. It is fast to light and insoluble to water, solvent naphtha, and the stability at 200°C. to press cure and dry steam cure, and to cold cure is satisfactory. The stability with blowing agents, *e.g.*, sodium bicarbonate and ammonium carbonate, and Vulcacel BN is also described as satisfactory. A very fine green pattern was obtained by using Vulcafor Fast Green 5 GS on the base mix at 0.75%; Pale Crepe 100; Zinc oxide 3; Stearic acid 1; Titanium dioxide 1; Blanc fixe 100; Nonox EX 1; Sulphur 2; Vulcafor DHC 0.75. Cure: 10 minutes at 141°C.

The Royle Forum No. 87 contains, as usual, a number of good things including a description of the Joseph Dixon Crucible Company whose 'position as a leader in American industry is not wholly due to the manufacture of lead pencils. It produces more than 5,000 items in six categories—lead pencils, crucibles and refractories, graphite lubricants, silica-graphite paints, crayons and art supplies, and powder metal parts.' But my space will not permit of a further description. Another fascinating article describes 'The Story Behind the United States Dollar,' by Marguerite V. Wolff, which should be equally of interest to readers in this country, if alas! . . .

But I cannot forgo quoting from 'Worth Remembering and Repeating.' Thus:

'The only way in which one human being can properly attempt to influence another is encouraging him to think for himself, instead of endeavouring to instil ready-made opinions into his head.'—Sir Leslie Stephens.

'The men who try to do something and fail are infinitely better than those who try to do nothing and succeed.'—Lloyd Jones.

'Compliments are like perfume; to be inhaled but not swallowed.'—Cervantes.

'A ship in harbour is safe, but that is not what ships are built for.'—J. A. Shield.

PHILIP SCHIDROWITZ

Questions Corner—89

(Second Series)

375. Why are surface active agents required when compounding polyvinyl acetate emulsions?

376. Nylon is now being recognized as a standard engineering material. Can it be used for bearings?

377. Give some of the characteristics and applications of polyurethane foams.

378. Briefly indicate some of the uses for polythene film, and what are its advantages?

(Answers next week)

Answers to Questions Corner—88

371. It is good practice to repulp all wet strength broke as soon as possible after making. Broke from the wet end of the machine may be used without difficulty in the usual manner. Broke from the dry end of the machine, and subsequent processes, requires special repulping technique.

There are three methods now used for disintegrating wet strength paper:

1. A rag boiler is filled with wet strength broke and water added to yield a high consistency. No alum is required if the water is under pH 7.0. The boiler is closed, steam injected to about 15-40lb. and the broke digested until hydrolyzed sufficiently to ensure complete defibring subsequently in the breaker. This takes, as a rule, from 2 to 3 hours.

2. Breakers or beaters are sometimes used. The necessary amount of water is added and heated to about 78°C. Alum is added to about 2-3% on the weight of dry broke, this being added with the roll raised off the bedplate. Shredded broke is most easily handled in the beater and preliminary steaming will generally help filling in and subsequent breaking down.

3. The Dilts hydrapulper has also proved useful for handling wet strength paper. Alum is added and the water heated to about 82°C. before adding the broke. If a short soak is allowed the broke is defibred quite quickly.

372. Nylons are characterized by being strong, tough, light, abrasion resistant, self-extinguishing, chemically resistant and with a low coefficient of friction. They are hygroscopic and will eventually absorb about 2½% moisture under average atmospheric conditions.

Nylon has a tensile strength at break of up to 37,000 psi and a bending stress of about 10,000 psi. Running with dry steel it has a coefficient of friction of 0.15 to 0.10 but when water lubrication is used this figure is reduced to between 0.05 and 0.02.

Nylon's chemical resistance is very useful where electrolytic action corrodes metal parts, particularly where a bimetallic junction is involved.

Physical and chemical properties may be altered to suit particular needs by changes in the composition, *e.g.* substituting sebacic acid for the adipic acid component (nylon 6/10) yields a a softer, tougher and more resilient polymer, with lower water absorption.

Nylon will not support mildew, bacteria or moth larvae which is a valuable characteristic when using nylon fibre for fabrics, stockings, etc. The high tenacity of nylon permits the manufacture of very sheer stockings as low as 15 denier. It is unaffected by solvents normally used in dry cleaning. Although not affected by dilute acids is hydrolyzed by long boiling in hydrochloric acid. This has been utilized to recover the original components from nylon waste. Its stability to alkalis is excellent.

373. One of the most important additives for polyvinyl acetate emulsions are the plasticizers which increase the flexibility of the resin films, though this has the effect of lowering the softening point and increasing the thermoplasticity of the films.

Plasticizers should be solvents for the resin and they are generally liquids of low volatility, although some are solids. The most important are esters of organic and inorganic acids and some chlorinated hydrocarbons. Consideration must be given when selecting a plasticizer to its volatility, water solubility, chemical nature, efficiency cost, physiological properties, light and heat resistance.

Those plasticizers which are easily incorporated may be added by simply stirring into the emulsion, *e.g.* phthalates, but it is essential to age the mixture for a least 24 hours so as to allow time for the plasticizer to be absorbed by the resin. Other plasticizers, *e.g.* chlorinated diphenyls, while easily mixed with the emulsion are not readily absorbed by the resin and are therefore pre-mixed with a small quantity of easily absorbed plasticizer to facilitate absorption by the resin.

On the other hand, some PVA emulsions are more difficult to plasticize than others. In such cases the plasticizer should be emulsified before addition to the PVA emulsion.

Dibutyl phthalate is widely used as a plasticizer largely because of its high efficiency and relatively low cost. Other phthalates used for special applications include aqueous dispersions of diphenyl phthalate in adhesives and dibutyl glycol phthalate for exterior applications.

Tritolyl phosphate, though toxic and less efficient, is used where flame resistance is required. Dimethyl glycol sebacate for cold flex resistance and non-migratory polyester plasticizers which are chemically inert, though somewhat expensive.

374. The following tests are used for assessing polyvinyl acetate emulsions:

1. *Particle size,* using an electron microscope, light transmission, etc.
2. *pH.* A conventional pH indicator with a calomel reference electrode, and a glass electrode.
3. *Specific gravity.*
4. *pH stability,* as with pH.
5. *Monomer content,* by chemical methods.
6. *Freeze-thaw stability,* by alternate freezing and thawing cycle.
7. *High temperature stability* by alternate cycles of heating to 60°C. and cooling to room temperature.
8. *Settling,* by using a 20% solids emulsion and allowing to stand in a graduated cylinder for three days.
9. *Foaming.* Comparisons are made on a conventional paint shaker and comparisons made with a standard.
10. *Mechanical stability.* This is somewhat empirical by using a household egg mixer, straining and examining for aggromolates.
11. *Borax tolerance* is useful for paints required for application to dry walls.
12. *Ion tolerance* by titration against a particular acid or salt.
13. *Odour.* This is purely empirical.

(More questions next week)

Polly Ester Says . . .

'Talking of exhibitions, if there is ever an adhesives exhibition it ought to be held in Bond Street!'

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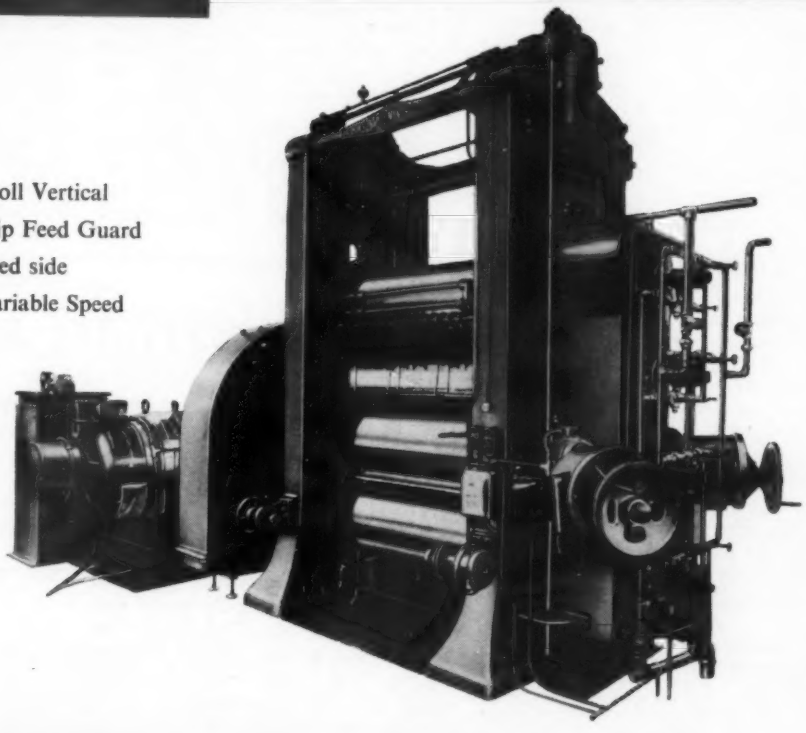

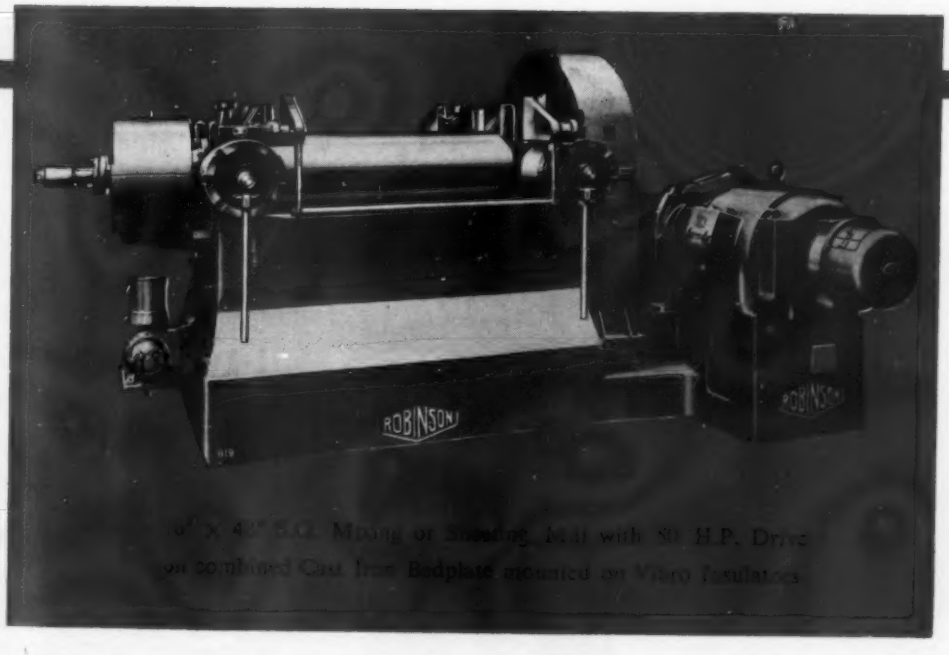

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MEN and MATTERS

A Review of People and Events

by George A. Greenwood

THERE comes notice from Sir Geoffrey Shakespeare, Bart., the chairman of the Industrial Co-Partnership Association, of an interesting event at the Connaught Rooms on Tuesday November 17, and an invitation to attend. It is a luncheon meeting to mark the accession to the office of president of Sir Alexander Fleck, K.B.E., F.R.S., chairman of Imperial Chemical Industries, who has recently accepted the invitation of the Association to assume this office in succession to the late Viscount Cecil of Chelwood. For this first occasion Sir Alexander will be the guest of the officials and members of the Association, and after luncheon will speak. I assume that he will devote himself very largely to its ideals and objects, which, apart from his responsibilities at I.C.I., are practically the ruling interest of his life, together with his interest in scientific and technical education.

Lord Baillieu

Another interesting personal item this week concerns Lord Baillieu, President of the Dunlop Rubber Company, who has been elected first president of the British Institute of Management. He is very much the sort of man for this job, for he sat on the Departmental Committee whose findings resulted in the establishment of the Central Institute of Management in 1946, and was elected a founder-member of its first council in 1947. He was also on the National Production Advisory Council on Industry from 1945 to 1953, and of the National Investment Council from 1946 to 1948, to name only a few of his many appointments outside actual productive industry and commerce. Fifteen years ago, of course, he was president of the FBI round about the time that he became deputy chairman of Dunlop.

There are other changes in the rubber trade. Mr L. Keith Ingram has been appointed to the main board of Rubber Improvement, from which Mr M. Sumray has resigned in order to carry out executive duties with Baxter's Leather Company. Mr Sumray was associated with this undertaking before it was acquired by Rubber Improvement, and in his new capacity will be meeting a large number of old friends once more.

A Tribute

One other item. I read at the weekend with moved interest the passages from the circulated statement of Mr L. I. Simpson, chairman of Kepong (Malay) Rubber Estates, which was presented to the annual meeting in London, and which referred to the death of his esteemed and well-known predecessor, Mr T. J. Cumming. 'In him,' said Mr Simpson, 'the company has lost a wise man, a true friend, and one greatly respected throughout the rubber industry.' We shall all say, 'hear, hear,' to that!

Mr Cumming, who was appointed a director of Kepong 21 years ago, and chairman in 1947, saw vast changes and advances in its fortunes during that time — developments which have resulted in a group profit for last year totalling £212,384. Its position will be greatly strengthened by the recent acquisition of the Buntar Rubber Estates Ltd., which owns 2,070 acres. Mr Cumming, by the way, was chairman or director of 15 rubber companies other than Kepong, and he was probably better known in Malaya and the other growing countries than he was in the City.

North British Appointment

The North British Rubber Co. announces the appointment of Mr C. Thomson, A.M.I.Mech.E., as sales manager, conveyor belting. Following apprenticeship with Barry, Henry and Cook, Aberdeen, Mr Thomson was for a time with Mavor and Coulson, Glasgow, followed by some six years in India in coal fields engineering. During the last war he served in the Indian Army. After release he joined Resistance Welders where his name came to the fore as inventor of the cable belt conveyor. On formation of the Cable Belt Co. he was responsible for the design and installation of the first conveyor accepted by the Coal Board. Mr Thomson spent some time in America with the licensees.

C. THOMSON

Prior to joining North British Rubber in January 1958, Mr Thomson spent four years as an independent consultant, working mainly on new projects in the field of conveyors and material transport for the Coal Board and engineering companies.

And Now Ilfracombe

Last week, you will remember, I referred to the steps which are being taken towards the establishment of a plastics factory at, above all places, Ilkley, in lovely Wharfedale. It now seems that this transfer of the plastics industry to beauty spots is becoming epidemic. For example, news reaches me that negotiations have been completed between the Ilfracombe Urban District Council and Lightweight Plastics Ltd. of Edmonton, North London, for the transfer of its company and activities to the North Devon resort. The company is at present a small one, but the move, I am told, is to facilitate expansion in production, and the Lightweight directors say they hope that in time a substantial number of local men will be employed.

It is significant that a step like this can prove not only acceptable to local authorities like that at Ilfracombe, but that, into the bargain, can be welcomed with open arms, as at Ilkley. The reason no doubt is that the manufacture of plastics and plastics goods can be carried on with little if any detriment to local amenities. Another point of interest so far as the Lightweight Company's project is concerned is that the directors are collaborating closely not only with the local council, but also with

the Ilfracombe Industrial Planning Committee.

In Human Service

In all gravity, and with a great sense of satisfaction, anybody connected with plastics will have read of the wonderful progress now being made in a plan to apply plastics to medicine and surgery in an entirely new form. Up in Durham, a miner, John Baker, broke his thigh at work and was in hospital, encased in plaster for 21 weeks, without much progress being reported. Then the surgeon talked to him about the possibilities of applying a plastic which had not been used in this country before, and said that if it worked, he could have miner John Baker on his feet in a matter of days.

Mr Baker agreed to be the guinea pig of the experiment. The plaster was removed, and the surgeon operated. Within a matter of days the man who had been laid up a cripple for nearly six months was able to go home, pottering about on crutches. Here is the surgeon's version:

> 'The plastic is put into the bone during the grafting, and it sets, iron-hard, very quickly. Although it has been used successfully in America, it is very much on trial here. We still don't know its value, but our hopes are very high. Every sign so far is that it definitely can put bones right in days, and we think it would also be suitable for spinal injuries. It seems to be a major advance in surgery.'

I wish there were some method of identifying precisely the nature of this plastic—an invention by United States doctors. Apparently, it is mixed on the operating table and poured into the hollow channels of the broken bones. It sets in about four minutes. Bone cells grow through and around the plastic, forming a natural join.

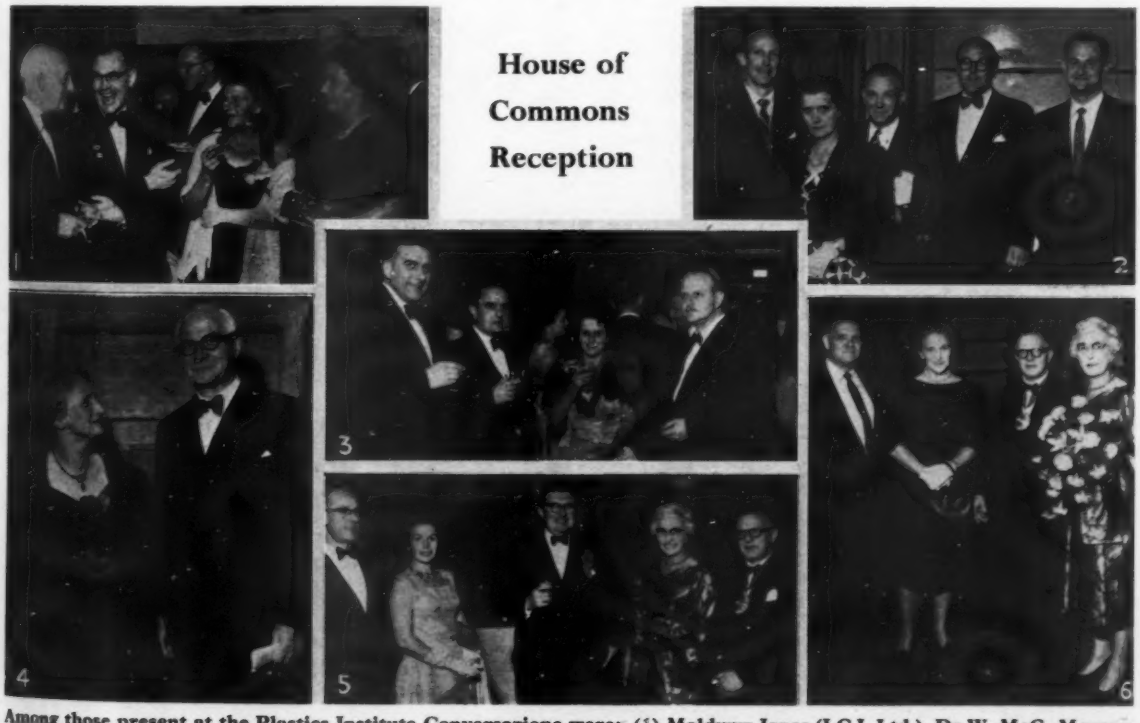
Plastics Institute Conversazione

THE President's Reception and Conversazione of the Plastics Institute was held this year on October 9 in the Members' and Strangers' Dining Rooms at the House of Commons. Guests were received by the President of the Institute, Mr H. F. Wilson, and Mrs Wilson, and the function was sponsored by Surgeon Lt.-Cdr. R. F. B. Bennett, V.R.D., M.Inst.Pet., M.P., the acting chairman of the Parliamentary and Scientific Committee. The Plastics Institute is represented on this committee by the president and secretary. Lt.-Cdr. Bennett, who is the M.P. for Gosport and Fareham, had only the previous day been re-elected.

It will be recalled that the first event of this nature was held in 1957 at the Science Museum, South Kensington.

The main feature of the evening was a conducted tour of the House of Commons and the House of Lords and a short film show was given for those interested.

House of Commons Reception



Among those present at the Plastics Institute Conversazione were: (1) Maldwyn Jones (I.C.I. Ltd.), Dr W. McG. Morgan (Monsanto Chemicals Ltd.), Mrs Morgan and Mrs Jones; (2) L. Howlett (Monsanto Australia), Mrs Butler, J. Butler (B.I.P. Ltd.), G. Tolley (chairman of council, Plastics Institute) (Allied Ironfounders Ltd.), J. Fraser (Monsanto Australia); (3) W. C. Fergusson (I.C.I. Ltd.), D. G. Owen (I.C.I. Ltd.), Mrs Fergusson and Dr C. L. Child (I.C.I. Ltd.); (4) Mrs Dring and G. Dring (Bakelite Ltd.); (5) J. M. Ratcliffe (secretary, Plastics Institute), Mrs Ratcliffe, Lt.-Cdr. R. F. Bennett, M.P., Mrs Wilson, H. F. Wilson (president, Plastics Institute); (6) Herbert J. Weber (Rotuba Extruders and Waljohn Plastics Inc., New York), Mrs Weber, H. F. Wilson, Mrs Wilson

J. Stopforth

AN APPRECIATION

AS announced in October 10 issue of *RJIP*, Mr J. Stopforth, a director of the Leyland and Birmingham Rubber Co. Ltd., has died at the age of 58. The following is an appreciation from Mr R. W. Lunn:

'I came to the Leyland and Birmingham Rubber Co. Ltd. over forty years ago and at once John became one of my assistants. He was scarcely more than a schoolboy at that time. I had a laboratory but very soon I

J. STOPFORTH

discovered that I had a much more fruitful field in the factory. We didn't abandon the laboratory but most of our efforts went straight into the factory. John was with me. The work prospered and it was not until quite a long time had passed that I looked upon this and began to wonder. In those days the "outsider" was received with grave suspicion and little kindness. With great regularity the "outsiders" made their entrances and their departures were not long delayed. To me something different was happening. As last I had to realize that my own merits could scarcely justify the way I was being not just accepted but absorbed by this factory. I had the wits—and the grace, I hope—to realize that I was being sponsored, and John—little more than a schoolboy—was one of my sponsors.

'For many years—I don't know for how long—he acted as secretary and then as chairman of our Preston Section of the IRI. It was under his influence that this section took on an exceptional form. Workmen drawn from the local factories formed a large proportion of the membership. There was nothing incongruous in this. Papers were read which they understood and appreciated. Papers were read which they had no chance of understanding. When that happened they knew they were meeting men who were lighting the way. It wasn't wasted. If I remember correctly Dr D. F. Twiss made his last public appearance at Preston. Dr Twiss was received as an outstanding figure in the industry—John saw to that. To see him and to hear his voice, to get some faint understanding of his fine qualities, was an experience to be enjoyed and remembered. This is not waste—this is how men are drawn together. John knew that.

'His real work which made him known throughout the industry commenced about ten years ago when the NJIC became interested in safe working in the industry. In our own work at Leyland we had had a long background of experience based upon the active support of all our men. We could work with informality and speed, but when it became necessary to expand this work through the industry—and upon an anonymous and voluntary basis—we had to work hard and quickly to give expression and order to the ideas upon which our own work was based. My team was small, extremely capable, violently active and all of one mind with me. Fortunately a large section of the industry accepted what came out of this. The early years were hard but encouraging. The later years have been harder but far less successful—but don't forget that we depend upon anonymous and voluntary action. John was with me through all this. He was my devoted supporter. We had facts to guide us and he believed as firmly as I believe, that on those non-technical accidents about which we have said so much, the real power lies in leadership to guide all those who work in our factories. They will join gladly in this work and they will take pride in its success.

'His greatest influence was felt when he became chairman of the Safety Officers Advisory Committee. He carried our thoughts to the members of that committee. Gradually he changed their thinking and truly they are as men inspired. I know because I meet them and I can measure the influence he has had upon them. I claim that on the committee we have the soundest and the most capable safety officers in industry. And they are all of one mind with us. That was John's work to make it so.

'On mill safety I was the most fortunate of men. When the basic ideas had been stated and when the first mechanisms were conceived, everybody joined in—literally everybody. When I laid it down that anybody must be allowed to see our mills, nobody in doubt must be sent empty away, the weight fell on John. I asked him to carry a record of those who came to see our mills. I saw it only today in looking over some of his records. We have had between three and four hundred visitors to see our mills. I know that he went out dozens of times to help people to solve their difficulties. The first conceptions are important but to spread those conceptions may be even more important. John did that work.

'Of his influence in this factory I feel that I can say little. It is too near. Whatever impact he made on the outside world was multiplied enormously amongst those he lived with. He had a simple and hard integrity, a wide and sympathetic power of understanding the reactions of men to the forces which lift them up or crush them down. He wore no mask. He could join in rejoicing, he could advise and guide, and he could console. It was all real. There are few men of such shining humanity and industry is in great need of them. We all know what we have lost.'

The new general post office at Cranleigh, Surrey, has a 30ft.-long three-position counter running the whole length of the hall. The front of this counter is entirely panelled with 'Warerite' Australian walnut woodprint bonded to 18mm. block board. 'Warerite' is manufactured by Bakelite Ltd.

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RABRM Technical Review

The first two of a new series of technical reviews have now been published by the Research Association of British Rubber Manufacturers. Both are by S. H. Morrell.

The first, entitled 'Solid Polyurethane Elastomers,' reviews non-cellular polyurethanes and includes the results of an evaluation of some typical rubbers by RABRM. Applications are discussed and it is concluded that although casting elastomers possess the best physical properties, the processable types may be preferable where the highest physical properties are not required.

In the second, following a discussion of the chemistry and technology of polyurethane foams, the author describes the properties of some typical members and also their applications. It is concluded that although for many purposes the polyether-urethane foams are preferable, polyester-urethane foams show advantages, particularly where a large absorbtion of energy is required.

The reviews are well presented in special covers and include mention of the member firms of the Association with special commercial interests in the subject reviewed.

Construction is to begin immediately on a styrene plant for C.S.R.C.-Dow Pty. Ltd. at Altona, Australia. George Wimpey and Co. Ltd., a firm with offices in London, England and Sydney, Australia, has been awarded the contract to build the facilities in association with the Bechtel Corporation of San Francisco and McDonald Constructions Pty. Ltd., of Sydney.

FBRAM Golf Competition

MEETING AT WENTWORTH

THE annual golf competition of the Federation of British Rubber and Allied Manufacturers was held on October 14 at the Wentworth Club, Virginia Water, Surrey. Much of the success of the day was attributable to the excellent weather, which has not always blessed past annual competitions, and to the perfect condition of the world famous course. The competition was played to Stableford rules.

The overall winner with the first best net score was D. Davies of the Davies Tyre Co. Ltd., who was accordingly the winner of the Challenge Cup. Other prize-winners were as follows: Second best net score, J. E. F. Ruffell (Durham Raw Materials Ltd.); third best net score, J. A. Forbes (BTR Industries Ltd.); first best gross score, W. W. Somerville (Dunlop Rubber Co. Ltd.); best net first nine, R. G. Hiam (Dunlop Rubber Co. Ltd.); best net second nine, G. E. Barker (Pirelli Ltd.); fourth best net score, H. C. Hardman (Veedip Ltd.); mystery prize (eagle), R. E. Holt (Dunlop Rubber Co. Ltd.); fifth best net score, P. C. Master (Manchester Oil); sixth best net score, S. Smales (Philblack Ltd.); seventh best net score, T. W. W. Davie (North British Rubber Co. Ltd.); mystery prize (neatest card), C. H. M. Barker (Firestone Tyre and Rubber Co. Ltd.); eighth best net score, H. Mitchell-Dawson (Rubberware Ltd.); ninth best net score, A. R. Currie (BTR Industries Ltd.); tenth best net score, D. L. Langrish-Smith (Kautex Ltd.); eleventh best net score, K. L. Langrish-Smith (Kautex Ltd.); twelfth best net score, H. F. Judd (Ioco Ltd.); thirteenth best net score, T. A. Beazley (BTR Industries Ltd.); fourteenth best net score, D. Rankine (Dunlop Rubber Co. Ltd.).

The prizes were presented after tea by Mr H. G. W. Chichester-Miles, president of the Federation.

A number of non-playing members of the Federation attended during the day and some 80 people sat down to dinner in the evening. Short addresses were made by Mr Chichester-Miles and by Mr R. G. Hiam.

FACING PICTURES

Some of those who were at Wentworth on October 14 were: 1, D. M. Edwardes and D. Rankine (both of Dunlop); 2, Dr W. D. Scott (BTR Industries) and D. D. Marshall (Greengate and Irwell); 3, P. C. Masters and J. Morris (Manchester Oil); 4, R. McEwan (ISR) and K. L. Langrish-Smith (Kautex); 5, H. F. Judd (IOCO) and E. A. Shield (A. Schrader's Son); 6, R. E. Berry (D. Moseley) and C. N. Weller (Shell Chemicals); 7, J. E. Ruffell (Durham Raw Materials) and D. Davies (winner) (Davies Tyre); 8, G. E. Barker (Pirelli) and C. D. L. Smith (Wilfrid Smith); 9, J. A. Forbes (BTR Industries) and D. L. Langrish-Smith (Kautex); 10, H. G. Hardman (Veedip) and R. Bassett (St. Helens); 11, R. Edwards (Akron Standard), S. G. Deaves (BTR Industries), D. D. Marshall (Greengate and Irwell) and I. Keith (BTR Industries); 12, G. E. Godfrey (Silvertown) and A. R. Currie (BTR Industries)

The first six prizewinners receiving their gifts from Mr H. G. W. Chichester-Miles are: 1, D. Davies; 2, J. E. F. Ruffell; 3, J. A. Forbes; 4, W. W. Somerville; 5, R. G. Hiam; and 6, G. E. Barker

FBRAM Golf Competition

(Captions facing page)

The Enigma of Mr Banbury

A MATTER OF NOMENCLATURE

By W. S. Penn

THIS year we are celebrating the 250th anniversary of the birth of Dr Johnson and, therefore, he cannot be said to have had any connexion with the development of the rubber industry. However, after Shakespeare, he was the man who, more than any other, stabilized the English language in which we must express our reports and articles.

How Dr Johnson would have thundered against some of the words which are coined in modern industry. The pages of the Gentleman's Magazine would have trembled at his words! My thoughts were drawn to this recently when reading an article on butyl rubber where the mix was 'Banburyed.' We all know what this means but what a clumsy word, and the name Banbury has been similarly ill-treated on many occasions.

The problem is quite simple, although the answer is difficult. What system of nomenclature do we adopt for internal mixers and the operations carried out in them? Let us analyse the situation and see what can be done.

Mr Banbury

Let it be said at the outset, that we all have the greatest respect for Mr Banbury. His mixers have revolutionized the rubber industry as much as Mr Bessemer's converters have the steel industry. His name will certainly be perpetuated for many years in hundreds of mill-rooms throughout the world.

Let us not forget too, that he is a person and not just a name. I was reminded of this by my wife at an IRI dinner some time ago when Mr Banbury was a guest. The name Banbury had filtered into domestic circles, no doubt when I went home in a temper because a batch of my special rubber had scorched in a Banbury mixer. My wife was most surprised when Mr Banbury stood up to give his address. Rarely are we privileged to meet the originator of a household word.

What then are we doing in bandying his name about in such a profane manner? Moreover, it should be recalled, and this adds to the complications, that 'Banbury' is a registered trade-mark in a number of countries throughout the world. Clearly something should be done to regularize the situation.

The Present Position

Since Banbury is a proper name, as well as a trade mark, it should be treated as such. There is no such thing as a No. 11 Banbury unless 'No. 11' is some obscure American christian name! It should be a 'No. 11 Banbury mixer."

Again, we are often tempted to write such a phrase as 'the water should be turned on the Banburies.' The plural is, of course, the Banbury mixers.

Since Banbury is a proper name, we cannot have the verb 'to Banbury.' Therefore to have a mix Banburyed is unthinkable. Next we shall be having the mix Werner-Pfleidereryed!

Nevertheless, one must have some sympathy with the writers. It is very tempting and convenient to write about Banburies and it becomes tedious to insert 'mixer' after Banbury every time. And we do sometimes need a verb in place of 'Banbury mixed.'

Is there then a solution? I believe that there is, and I offer the following suggestion with greatest respect to Mr Banbury and the concessionaires of the trade-mark.

A Generic Name

The problem can be solved at once if Banbury is no longer used as a proper name. If it becomes a generic name, banbury, for such internal mixers, then the difficulties outlined above disappear.

There are many precedents for such a step. Monsieur Ampère and Mr Faraday became amps and faradays and there appears to be no reason why Mr Banbury should not join the ranks of such distinguished men. Many other examples will no doubt spring to mind.

The problem of the trade-mark can be resolved in a similar way and again there are precedents. The best known trade name for polyvinylidene chloride was Saran and for polychloroprene, Neoprene. The manufacturers of these products have generously given these names to the world as generic descriptions of products—saran and neoprene.

Will then Mr Banbury, and the manufacturers of Banbury mixers, give the name 'Banbury' to the rubber industry? Everyone would be most grateful.

The Future

Assuming the new word 'banbury,' the derivatives of it become quite simple. As far as the plural is concerned, there would be banburies and as far as the designation of the size is concerned, it would be correct to say a No. 3a or No. 9 banbury.

It would even be possible to coin the verb 'to banbury.' One would then banbury a mix and even have the past tense 'banburied.'

Even with this concession, Dr Johnson would not approve because there was never a more obstinate man when it came to English. As for 'American' it simply did not exist. Dr Johnson once said 'The world has gone mad with innovation . . .' which is truer today than it was then. Even if we cannot then receive his approval, perhaps we can obtain his reluctant acquiescence and what could be a better remembrance of him in this anniversary year?

Mr H. G. Stern, A.M.I.E.E., has been appointed a director of Londex Ltd., London, S.E.20. For the past six years he has been head of the control department.

A transparent boat vacuum-formed from sheet of tough, lightweight Tenite butyrate, manufactured by Eastman Chemical Products Inc., New York, will carry up to 600lb. with plenty of freeboard, and may be powered either by oars or by a 3h.p. motor. Transparency of its hull permits easy study of fish and marine life or quick selection of the best spots for fishing or skin-diving

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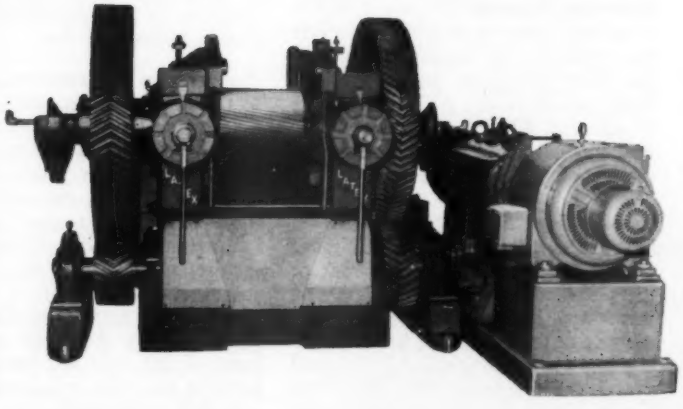

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Rubber and Plastics News

CONTINENTAL AND FOREIGN DEVELOPMENTS

GREAT damage is caused to hydraulic turbine installations by the enormous amount of sand contained in the waters of China's Yellow River. Research into the sand-abrasion of metallic materials has led the Chinese to the conclusion that it is not of much use to attempt to solve this problem by variation of the metals used. Instead, a study has been made of the modern enamels, silicoboron glass and specially hard resins. All these materials have been found to possess good mechanical properties as well as high resistance to abrasion and good ability to coat a metallic surface. It is considered possible that the solution of the problem may be obtained by the application of a layer of, for example, synthetic resin on the surface of turbine parts. With such a coating, the surface of the turbine acquires an excellent smoothness, which enables turbine efficiency to be increased by 2 to 4% owing to the great reduction of friction. The surface coating of the turbines, has thus an economic as well as a practical value.

Russian Graphite

The Russians have done a considerable amount of work in producing new graphitic materials, especially in the saturation of graphite with phenol-formaldehyde resins. Valuable materials for the design of apparatus are prepared from these materials.

Corrosion Resistance

From Italy comes a corrosion-resistant product consisting of a metal body having a coating of polyvinyl chloride bonded to it by a polymer of a substituted or unsubstituted vinyl pyridine. The coating may also contain a plasticizer.

German Surface Coating

A new type of German surface coating used as a painting agent contains a fatty oil, a natural or synthetic resin or modification, together with an aluminium-containing synthetic resin obtained from an aluminium alcoholate.

Catalysts for Polymerization

The development of new catalysts has rendered it possible to lower from +50 to 5°C. the polymerization temperatures of nitrile rubbers. This fall in temperature has had an effect upon the molecular structure of the elastomers in the direction of higher average molecular mass, lower number of side-chains and branches, higher copolymerization regularity, with as a result a more regular structure. Higher viscosity gives the compounds better mechanical properties after vulcanization. These elastomers are being termed 'cold rubbers' and increasingly substituted for hot-polymerized elastomers. The raw compounds from rubbers polymerized at low temperatures are usually lower in plasticity, when green, earlier vulcanized, and have higher mechanical properties, than the corresponding hot-polymerized elastomers.

Plastics for Bread Making

A master-baker of lower Saxony, is baking bread in its wrapping. The dough, previously moulded, is placed in an envelope of special plastic material whose dimensions are calculated in such a way that they closely follow the form of the bread after baking. It is claimed that the packing protects the bread adequately during transport, uses the oven better, keeps the bread fresh for a longer period, and gives it a more aromatic savour, as is indicated by tests of an independent character. Some large bakeries have already adopted the process.

Insulating Material

In Italy, after several years of study and research, an insulating material has been developed, partly obtained from special resins, which is capable of resisting 400,000 volts. The new insulant will be applied to the manufacture of cables and joints.

Packing System

A new form of packing from France takes the form of the classic cask or metallic can whose internal protection is achieved by a patent process. This allows one to obtain a pocket or pouch without any welding which is adapted exactly to the interior of the can. The flange of the pouch is pressed down on the metallic neck and adheres closely to the exterior, so preventing any infiltration between pouch and metallic container on filling. In packing of this type, the physical resistance of the metal and the chemical resistance of the polythene are allied. The pouches are easily detachable, which solves the problem of internal cleaning, so often unsatisfactory. Containers are made in this form for acids, monomers, inks, pastes, colours, detergents, etc. The pouches in plastic material can be allied with other materials, such as cardboard or tin, to make up small packages of 5 to 10 litres, for example.

Nylon Carpet with Latex

Also from France comes a carpet with nylon hair, initially woven, then fastened to the base by foam latex. It does not retain spots. By reason of the basis of foam latex, dust cannot get through the carpet and is readily removed by the vacuum cleaner. The carpet is neither nailed nor stuck on, but simply placed on the floor, adhesion of the latex preventing all slip. Cut when in place, it conforms to all the contours of the room. Washable, resistant to wear, mothproof, the carpet has all the properties of nylon, the class and fineness of fur, and the comfort of a thick carpet of foam rubber.

Plastics Paper

A Japanese company is about to make paper in nylon and vinyl, by means of a process invented by a professor. This new paper will, it is claimed, be more solid and smooth than ordinary paper, and will offer a maximum resistance to fire. It can be used in the manufacture of bank-notes or for the filtration of air containing radioactive dust.

Temperature Measurement

The French have put forward a process for the measurement of temperatures, which can be applied to all rolls, whether for heating, turning, free or controlled, and particularly to those used in the rubber and plastics industries, chemical product manufacture, paper works, etc. It allows the exact knowledge in a continuous and *constant* manner of the temperature to which the tables or working parts of the rolls are brought. The parts of the rolls in contact with the materials to be worked are sometimes inaccessible to external elements of control. These means, when they can be used, are fragile, troublesome, and give uncertain results, which in most instances cannot be permanent. It is also possible by this process to know the temperature of a turning part, such

as the barrel of the roll, shaft journals, etc.

French Cellulose Textile

Two years ago the range of traditional textiles used as a foundation for cotton, flax, hemp, jute, etc., was enriched by a new support. This uses a textile fibre having certain technical advantages. It is composed of a thread containing a cellulose base, produced according to a special manufacturing and weaving process in a range of deniers. It has, among other advantages, three major properties: an extremely high resistance, almost that of nylon; perfect dimensional stability, low elongation and freedom from shrinkage, and an excellent resistance to tearing. It is of French manufacture.

Aqueous Emulsions of Butyl Rubber

Butyl rubber, co-polymer of isoprene, prepared by polymerization in mass at a very low temperature in an organic solvent, was only known by users in the form of balls of gum or solutions in solvents. A new French process has now made it possible to obtain aqueous emulsions of butyl rubber. At the moment the manufacturer is only in a position to supply samples of this material in limited quantities for tests, but a plant is being put down for industrial production. The new emulsion is basic and contains about 50% of dry extract. Although formed of extremely fine particles, it is physically and mechanically stable, even when highly diluted. Non-toxic, filmogenous and agglomerating, it has a viscosity readily adjustable to the needs of the user. Mineral charges, certain organic solvents, natural or synthetic resins and vulcanizing agents, either hot or cold, can be added to it with flocculation.

Polyisoprene

The study of maleic anhydride reactions upon the natural polyisoprene has shown that when operating at high temperatures, around 180 or 300°C., on rubber dissolved in an aromatic solvent and without oxygen, the anhydride can be fixed with extremely few cross-linking scission reactions, so as to produce a chemically modified material, while preserving the required high resiliency qualities. Different chemical derivatives of this new elastomer have been prepared, *i.e.*, the hydrolysis product —polycarboxyl rubber — polyanilide and benzyl polyesters. The properties of this rubber depend largely on the fixed anhydride content, but on average differ sharply from the properties of the reference product. In solubility of crude rubber and swelling rates of vulcanizates, the product is the reverse of natural rubber, according to the degree of polarity of the solvent. Mechanical properties are generally excellent.

SBR Grades

New grades of SBR have been manufactured in France. One is extended to the oils (50% elastomer, 50% naphthenic oil of extremely clear colour), which can be substituted for the elastomers of the same type whose oil content does not exceed 40%. This product can be used in mixtures of clear colour now being made, and its coagulating system allows of its use in the electrical industry. The other is supplied in granules, and eliminates the always difficult operations of cutting out. Its method of manufacture allows of easy dispersion, and the manufacture of clear mixtures. It can be used for electric cables.

Dutch Process

The Dutch have introduced a process which consists in first manufacturing the article starting from a basis of latex foam (*e.g.* manufacture of a cushion by the habitual method), then inhibiting the finished cushion with a solution of 10% resorcin in NaOH. After being dried, the cushion is then dipped in a solution of 40% formaldehyde which forms, after drying, the reinforcing resorcin-formaldehyde resin.

Rubber Ageing

From Germany comes a process for protecting rubber against ageing and fatigue by means of a mixture of p-phenylenediamine and 2.2.4 trimethyldihydroquinoleine.

Alveolar Rubber Latex

From a French source comes a process for lowering the material cost of alveolar rubber latex, characterized by the use as diluents of bituminous or asphaltic emulsions. The latex so diluted is treated by classic methods for forming the foam.

Book Review

THE TECHNIQUE AND PRACTICE OF COSTING FOR THE RUBBER MANUFACTURING INDUSTRY.—Prepared by a sub-committee of the Accountants' Committee of FBRAM. (Available from FBRAM, London, 15s. post free.)

A new and revised edition of 'The Technique and Practice of Costing for the Rubber Manufacturing Industry' will be published on October 15 1959 by the Federation of British Rubber and Allied Manufacturers.

The distinctive feature of this handbook is the final section, which applies in detail the system of budgetary control and standard costs outlined in the earlier chapters to the particular case of an imaginary rubber company, and shows how by this means the cause of losses previously unsuspected can be brought into the open and effectively controlled.

The first edition, compiled by the Accountants' Committee of the Federation and published in November 1954, was so well received by the rubber industry and by accountants generally, both in Great Britain and overseas, that it was already out of print by the end of 1957. The second edition has been completely revised by the original authors, details brought up to date, and new illustrative tables added to the chapter of examples.

∴ Copies may be ordered through the Books Department, RUBBER JOURNAL AND INTERNATIONAL PLASTICS, Maclaren House, 131 Great Suffolk Street, London, S.E.1.

Mr J. M. Gullick has been appointed a director of Labu Cheviot Rubber, Malacca Rubber Plantations and Lambak Rubber in place of Mr C. Mann, who has resigned.

Television masks are made by the Plastics Division of Universal Metal Products Ltd., Langley Road, Salford 6, Lancs., from high-impact polystyrene material by the vacuum forming process. They are made in sizes 14in. to 17in. and in fawn, black, grey and vellum shade

Rubber Statistics

GERMANY — JAPAN

FURTHER details are now available regarding the rubber position in Western Germany during the first half of the year.

Imports of natural rubber up to the end of June included 61,503 tons of crude and 6,397 tons of latex, making a total of 67,900 tons as against the comparable 1958 figure of 59,895 tons. Malaya was the principal supplier of this rubber, sending 32,532 tons as against 29,808 tons in the earlier period, while Indonesia sent 11,049 tons, Ceylon 6,696 tons, Nigeria 6,167 tons, Thailand 2,375 tons, the Belgian Congo 1,311 tons, Burma 1,977 tons and Vietnam 4,630 tons. After allowing for exports of 486 tons, there remained a new supply of natural rubber of 67,414 tons compared with the 1958 total of 59,824 tons.

This year's consumption totalled 62,700 tons of crude and 6,226 tons of latex, or 68,926 tons in all compared with last year's total of 64,368 tons, an increase of 7%. Stocks of natural rubber on hand at the end of the half-year included 11,215 tons of crude and 1,708 tons of latex; this represented a decline of some 2,500 tons of crude compared with the position at the beginning of the year.

Production of synthetic rubber in Western Germany during these months amounted to 19,201 tons, almost three times the figure for the first half of the previous year, 7,318 tons. In addition, there were imports of synthetic amounting to 16,840 tons, of which 12,591 tons came from the USA and 2,566 tons from Canada; in the previous year, these imports had been somewhat higher at 20,547 tons, and their place has clearly been taken to a certain extent by the home-produced article. Consumption of synthetic during the half-year amounted to 31,223 tons, representing an increase of some 7,000 tons or over 25% over the previous year's consumption. Stocks held at the end of the period stood at 5,911 tons, having fallen to this level from the 7,224 tons held at the beginning of the year.

Reclaim rubber production totalled 19,796 tons, an increase of about 1,000 tons over the 1958 total, while consumption amounted to 19,723 tons compared with 17,742 tons, an increase of more than 11%. Stocks of reclaim on hand at June 30 had fallen to 3,995 tons from the January 1 figure of 4,897 tons.

Japan

Up to the end of May, Japan imported 55,382 tons of crude natural rubber and 5,477 tons of natural latex, the total imported (60,859 tons) representing an increase of some 25% over the comparable 1958 total of 48,267 tons. Malaya supplied the bulk of these imports (47,546 tons), while further amounts were received from Indonesia (1,471 tons), Thailand (2,357 tons), Ceylon (5,152 tons) and British North Borneo (3,286 tons).

The natural rubber consumption total for these five months amounted to 56,690 tons of crude and 5,230 tons of latex, or 61,920 tons in all compared with the 1958 figure of 48,560 tons, representing an increase of about 25% as in the case of natural rubber imports. Stocks of natural rubber at the end of the period stood at 12,631 tons of crude and 1,388 tons of latex; stocks of crude had fallen to this figure from the year-end level of 13,939 tons.

Imports of synthetic rubber during these months amounted to 11,861 tons, of which 9,571 tons came from the USA and 1,925 tons from Canada; this represented almost twice the comparable 1958 imports, which amounted to 6,109 tons. Consumption of synthetic during these months amounted to 10,870 tons compared with 6,400 tons in the earlier period and stocks at the end of May stood at 4,041 tons, having amounted to 3,050 tons at the beginning of the year.

Dr Vincent Schmidt, director of the board of the Sumatra Planters' Association, has retired from that post and has returned to Europe. He has appointed Ir Tan Hong Tong, formerly deputy director of the Research Institute of the SPA (ex-Algemeen Proefstation der AVROS) as his successor.

Plastics

SEPTEMBER IMPORTS AND EXPORTS

ACCORDING to the official Trade and Navigation Accounts for September, UK imports of plastics materials during the month amounted to 4,286 tons compared with 4,737 tons in September 1958. The values were £1,692,075 and £1,431,066, respectively.

The major source was the United States which sent 1,544 tons worth £817,233. Imports from Western Germany accounted for 1,039 tons of the total, valued at £414,344.

Exports of plastics materials during September totalled 12,924 tons, valued at £3,268,034, and compared with 10,094 tons worth £2,566,028 in September 1958. Of this year's total, Hong Kong took 921 tons, worth £207,048; Australia 715 tons, £269,300; Western Germany, 736 tons, £170,267; Sweden, 717 tons, £179,937.

Details of imports of plastics materials during September are as follow:

	Tons	£
Alkyd solid and liquid resins, solutions, emulsions and dispersions	194	37,492
Cellulose plastics:		
Photographic (including cinematograph) film base (except acetate butyrate)	209	250,028
All other	199	201,461
Polyvinyl chloride:		
Polymers and copolymers	872	138,237
All other	393	163,792
All other	2,417	901,065
Total	4,284	1,692,075

Exports of plastics materials in September, with values, were as follow:

	Tons	£
Acrylic sheet, rod, tube, film, foil and profile shapes in primary form	463	286,570
Aminoplastics:		
Solid and liquid resins, including solutions	678	96,957
Moulding and extrusion compounds	492	83,019
Cellulose plastics:		
Moulding and extrusion compounds	359	107,979
Sheet, rod, tube, film (excluding regenerated cellulose), foil and profile shapes in primary form	129	84,107
Phenolics and cresylics:		
Solid and liquid resins (straight and modified)	627	138,317
Other	421	140,194
Polystyrene	1,045	204,984
Polythene sheet, rod, tube, film, foil and profile shapes in primary form	164	61,639
Polyvinyl chloride:		
Polymers and copolymers	927	137,939
Moulding and extrusion compounds	1,120	264,909
Sheet	492	195,282
Other	78	19,491
All other	4,993	1,355,969
Waste and scrap	949	90,678
Total	12,937	3,268,034

PATENT SPECIFICATIONS

The following information is prepared from published Patent Specifications by permission of the Controller of H.M. Stationery Office. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, W.C.2, at 3s. 6d. per copy (including postage).

Injection Moulding Machine

No. 808,369. Tube Turns Plastics Inc. Inventor: J. W. Hendry. Application and Filed, July 2 1956. Published, February 4 1959.

An injection moulding machine is provided with a pre-plasticizing unit designed for continuous operation in contrast to known preplasticizing units which are normally designed for intermittent operation.

Fig. 1 is a general view of the machine, partly in section, while Figs. 2, 3 and 4 are sections taken on the lines II—II, III—III and IV—IV of Fig. 1 respectively. A shown in Fig. 1, a housing 1 defines a ram chamber 2 of any convenient type as described in more detail in Specification No. 684,582 or No. 730,750. Associated with the housing is a preplasticizing unit 3 having a hopper 4 for supplying plastic material to the interior of the unit and having also a screw 5 for working and agitating the plastic material and simultaneously conveying it into the ram chamber.

A ram 10 is reciprocably positioned within the ram chamber 2, a reservoir 11 being located within the ram and being preferably positioned slightly eccentric with respect to the ram. A slot 12 extends through the side of the ram to provide communication throughout the full length of the reservoir to the exterior of the ram. A passageway 13 passes through the lower end of the ram and a valve fitting 14 is fitted in cooperation with the passageway for the dual purpose of holding in place a valve 16, as a check valve, and for providing a working face for the ram. A central opening 17 (Fig. 4) extends through the valve fitting and has an enlarged portion 18 defining seats 19 to limit the downward movement of the ball 6. The passageways 21 provide means for conducting plastic material past the ball 6 when this is in its lowermost position on the seats. The lower end of the passageway 13 is provided with a seal 22 against which the ball 6 rests when it is in its uppermost position.

A reservoir plunger 28 is located within the reservoir 11 and is provided with a guide 29 (Fig. 3) which is slidably received into the slot 12. A nozzle 39 is fastened to the lower end of the housing 1 in communication with the ram chamber 2 and communicates at its lower end with a mould of conventional form indicated by the broken lines at 41.

In operation of the machine, plastic material is introduced into the hopper 4 and is worked and plasticized in the preplasticizing unit in the manner described in Specification No. 684,582. With the apparatus in the position shown in Fig. 1, that is, with the ram in its fully downward extended position the screw 5 will force plasticized material into the reservoir 11 at a continuous and steady rate. As soon as the plastic material then in the mould from the previous stroke of the ram has hardened sufficiently that it is no longer necessary to maintain pressure by the ram 10 on to the material in the mould 41, the ram will be retracted in the usual manner. As the ram retracts, the reservoir plunger 28 (remaining in the same position with respect to the housing 1 as it is when the ram is in its full downward position) and the lower end 43 of the reservoir 11 will come towards each other and exert pressure on the plastic material within the reservoir.

As the pressure increases, the plastic material will be forced out through the passageway 13 and past the check valve 16 into the ram chamber 2 below the ram 10. When the ram 10 reaches its full upward position, it will occupy the position shown in broken lines at A in Fig. 1 and plastic material may, if necessary to fill the ram chamber, continue to flow through the slot 12 into the reservoir 11 and past the check valve into the ram chamber. As soon as the ram chamber is filled with plastic material, the ram 10 is caused to move downwardly, and as it moves, the check valve 16 moves against its seat 22 and the plastic material in the ram chamber is pushed downwardly and through the nozzle 39 into the mould 41 in the usual manner. As the ram moves downwardly, the continuously running screw 5 continues to fill the reservoir 11 with further plasticized material in preparation for the next cycle of operation. As the slot 12 is moved when the ram 10 reciprocates, the guide 29 will clear the slot of plastic material which might otherwise accumulate in the slot, and thus the passageway from the preplasticizing unit 3 into the reservoir 11 will never be appreciably diminished.

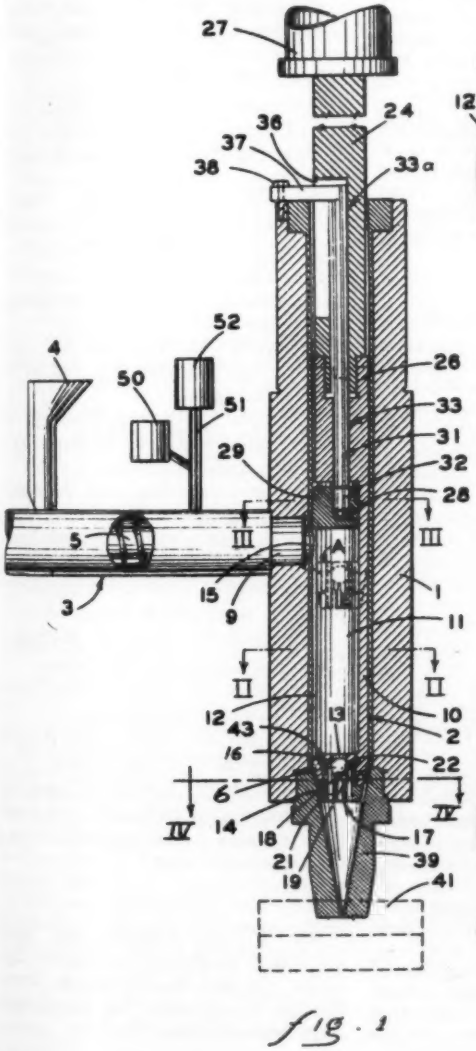

fig. 1

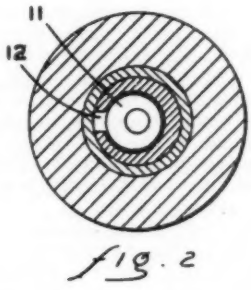

fig. 2

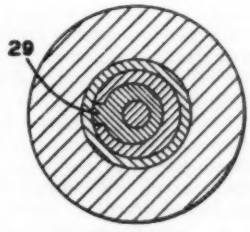

fig. 3

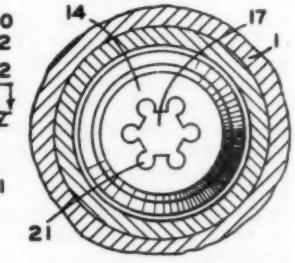

fig. 4

Plantation Share Survey

SINCE we last went to press there has been a sustained boomlet in the shares of the majority of rubber companies. The yield attractions of this section of markets proved too much for the average investor who found that he could obtain only 3% to 3½% on the high grade 'blue chip' industrials and even at this level had to accept a high risk element.

It is difficult to pinpoint the exact date when rubber shares started to move into favour but its early beginnings were in evidence at the beginning of the year and the movement was well into its stride prior to the election result being known.

Only a short while ago every commentator on rubber shares could cite yields of 20% and more on a number of the leading equities in this market. The figure has now narrowed to well under 10% for the leading ordinaries.

There are manifold reasons for the rise in rubber shares and for the return of confidence in them. There can be little doubt that the real hub of the situation is the extremely heavy buying of rubber from the Communist bloc earlier this year. This buying has created a shortage of the 'spot' commodity which was in turn brought about when demand was most buoyant. There has been a vigorous rise in price which has been maintained despite a number of warnings from experienced men within the trade.

It would appear that on 'average' prices for the year most rubber producers (excluding, of course, the unknown contingency of forward contracts) will have sold their output at prices exceeding last year's level by 4d. or even 5d. per lb. As an increase of only 1d. can amount to increased gross earnings on the equity of up to 6% the prospects for dividends in the current year are, to say the least, exceptionally bright.

It may well be that even the current yields, which are based on last year's earnings and dividends, may considerably underrate and obscure the real potential.

This is the backcloth to a rise in prices in this section of markets over the past two weeks of some 20%. Production in Malaya which is now considered to be the most stable producer, is ahead of last year and it is still short of the estimated figure for total consumption. It would appear, on statistics alone, that this situation will continue until late in 1960. There are, however, several clouds. The shorter outlook is made uncertain by the puzzling policies adopted by the two main Western nations in their disposal of strategic stockpile reserves. The London rubber market has recently been upset and restored by the decision of the British authorities to proceed with its 100,000 ton sale on a monthly ration basis and then its (presumably) temporary withdrawal from the market.

The longer term outlook is obviously affected by the unfavourable price comparisons that now exist between synthetic and natural. This is apparently causing some swing from the latter to the former in the most important market of all—America. The USA would appear to be currently using 66% synthetic. It has been commonly assumed that the ratio to natural would never exceed 65%-35% in spite of the obvious price considerations.

Once a market has been lost to synthetic it is rarely regained, so the movement, which one must remember is based on the mass consumption market of the USA, is regarded as being quite serious. There can be little doubt that most of the leading producers would like to see the price of natural reduced considerably. They quite rightly argue that the present boom in price will not do the industry any harm on a short term basis but could have grave repercussions if it is continued for a lengthy period.

It would, of course, be impossible to tabulate even half the items of company news emanating from rubber companies in the past month. From the many interims already declared it would appear that dividends are to be on a generous scale.

The CHULSA RUBBER concern is lifting its interim dividend from 3% to 7½%. KUALA PEGAU is paying a total of 10% against only 2½% last time. These are two of the more outstanding examples. MALAYALAM PLANTATIONS on the other hand has merely maintained its total distribution at 20% and stated that profits for the year to March last will not differ materially from those of a year ago.

From a revaluation of properties the GADEK RUBBER board is to make a share bonus in the ratio of one-for-seven which will restore the capital to its former level.

An interim dividend of 7½% is to be paid to shareholders in RAMBUTAN RUBBER against a total of 10% a year ago. SEAPORT (SELANGOR) is maintaining its dividend at 12½% from profits of £39,000 against £40,000 last time.

The K.M.S. RUBBER group has received an offer from KAMUNING (PERAK) RUBBER for the undertaking and certain assets. The offer is on a share for share exchange basis and K.M.S. shareholders will receive an estimated addition of 1s. 3d. per share in cash on the liquidation of their company.

An extraordinary general meeting of HIGHLANDS AND LOWLANDS shareholders is to be called to approve a one-for-five free scrip issue. An interim dividend of 12½% is also declared.

The interim dividend of BADENOCH RUBBER is lifted from 5% to 10% while MALACCA RUBBER an interim of 7½% against nil.

US Study Tour

A study tour of the plastics industry in the United States, in conjunction with the forthcoming Exposition of Chemical Industries at the New York Coliseum, has been arranged by Ashton and Mitchell Travel Ltd., 2 Old Bond Street, London, W.1, to whom application should be made. The tour, which starts in London on Saturday November 28, is scheduled to last 15 days.

A very full itinerary has been planned, the main features of which are as follows:

November 28: Arrival in New York. Tour of the City.

November 29: Further tour including visits to United Nations, etc.

November 30: Visit to Lum Laminates Inc. in the morning and tour of the Exposition of the Chemical Industries in the afternoon.

December 1: Visits to Shell Oil Co., Union, New Jersey, and the Commercial Plastics and Supply Corporation.

December 2: Free morning. Travel to Philadelphia in the afternoon to visit the F. J. Stokes Corporation.

December 3: Visit to E. I. du Pont de Nemours and Co., Wilmington, Delaware.

December 4: Visit to Hercules Powder Co. and Haveg Industries Inc., Wilmington.

December 5: Tour of Washington.

December 6; Visit to Niagara Falls and other spots.

December 7: Tour of National Aniline Division of Allied Chemicals at Buffalo and of the Farrel-Birmingham Co.

December 8: Visit to General Electric Co., Springfield, Mass.

December 9: Visit to Monsanto Chemical Co. at Springfield.

December 10: Tour of the Foster Grant Co. at Springfield.

December 11: Visit to the Lowell Technological Institute, Boston.

December 12: Return to London.

Arrangements have also been made for evening entertainment, etc., throughout the tour.

Mr F. G. Howard has been appointed a director of Hackbridge Cable Co. and its subsidiaries, Bryce Electric Construction Co. and Kelvin Non-Ferrous Metal Co.

Rubber Markets

LONDON

A further recovery has been recorded in Spot and nearby positions in the London rubber market during the past week after the previous week's sharp fall and partial recovery. This reflected the continuing severe shortage of nearby supplies, a shortage which it became apparent would not be relieved by Board of Trade sales from its stockpile. On the week Spot is 1⅛d. up at 34⅜d. nominal and nearby positions are over 1d. per lb. higher. The distant positions have been little affected and record only small movements.

Latest prices are as follows:

No. 1 RSS spot: 34⅜d. nominal.

Settlement House:
December 32d.-32¼d.
January/March 30⅜d.-31d.
April/June 29¼d.-29⅜d.
July/September 28⅜d.-29d.
October/December 28⅜d.-28⅝d.

No. 1 RSS cif basis ports:
November 32¼d.-32⅜d.
December 30⅜d.-31d.

Godown:
November 112¼ Straits cents nominal.

LATEX

Centrifuged latex per gallon in drums, November shipment, 21s. 8d. traded, cif European ports. Spot, unobtainable, nominal 22s. 6d. Bulk, not quoted. Creamed, seller, 20s. 6d. December. Normal, seller, 15s. 10d. December.

AMSTERDAM

The Amsterdam rubber market ruled as follows on October 26:

No. 1 RMA	Guilders per kilo Oct. 26	Previous
October	3.18	3.18
November	3.13	3.13
December	3.04	3.04
Oct./Dec.	3.05½	3.05½
January	2.96	2.89
February	2.96	2.89

Sales: Nil Tendency: Firm

SINGAPORE

Prices were marked up sharply at the outset on October 26 in sympathy with the strength of overseas markets. Later, the market moved irregularly. There was large scale short-covering and profit-taking. Lower sheets were largely neglected. Short-covering in the afternoon brought a further upward movement but heavy profit-taking developed and caused buyers to withdraw. Towards the close, some new buying caused sellers to become more reserved. This tendency continued during after-hours. Lower sheet interest was centred in nearbys. The market finished on a steadier note.

Straits cents per lb., fob Malayan ports to open ports	Close	Previous Close
No. 1 RSS, Nov.	110⅜—110⅞	105⅜—105⅝
Dec.	105⅞—106⅜	101⅞—102⅛
No. 2 RSS, Nov.	109½—110½	104⅝—105½
No. 3 RSS, Nov.	108½—109½	103⅞—104⅞
No. 4 RSS, Nov.	106 —108	102 —103
No. 5 RSS, Nov.	104½—106	100½—101½
No. 1 RSS, Spot	115 —116½	109½—110½
No. 3 blanket, thick, remilled, Nov.	106½—108½	102 —104
No. 1 fine, pale crepe	121 —123	116½—118½
2X thin brown crepe, Nov.	106½—107½	102½—103½

Tendency: Steadier

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rec. drums fob at 212.80d. per gallon.

BANGKOK

No. 1 RSS

The price for No. 1 RSS, at Bangkok on October 26, was 34.50 (33.87½) US cents per lb.

NEW YORK

The New York rubber market ruled as follows on October 26:

DEALERS' PRICES

Ex-Dock, US cents per lb.	Oct. 26	Previous
No. 1 RSS, Nov. ..	44a	40½n
Dec. ..	40n	38n
No. 2 RSS, Nov. ..	43⅞a	40½n
Dec. ..	39⅞n	37⅞n
No. 3 RSS, Nov. ..	43½a	40n
Dec. ..	39½n	37½n
No. 1 RSS, Spot ..	46n	42n
No. 3 Amber blanket, crepe, Jan. ..	37½n	36n
No. 1 latex, thin crepe, Nov.	Unquoted	40n
No. 1 latex, thick crepe, Nov.	Unquoted	40½n

FUTURES—REX CONTRACT

US cents per lb.	Close	Prev. Close
Nov. ..	43.90–43.95t	40.74t
Jan. ..	38.00t	36.90t
March ..	36.50t	35.75t
May ..	35.80t	35.00b–35.20a
July ..	35.15t	34.50b–34.75a
Sept. ..	34.85b–35.05a	34.25b–34.50a
Nov. ..	34.55b–34.75a	34.00b–34.25a

Sales: 190 Tendency: Firm

The November position continued strong on the Exchange on October 26, up more than three cents for the day, but other positions fell back somewhat from their highs. Dealings were fairly active for the day. Physical rubber was quiet and factories were backing away from the high price levels. In the closing stages, nearby November was up more than three cents for the day. The other positions held firm.

DJAKARTA

The market was very steady on October 26.

	Rupiahs per kilo Oct. 26	Previous
Spot, No. 1 Priok ..	36.25b	34.75b
Spot, No. 2 Priok ..	35.50b	33.75b
Spot, No. 3 Priok ..	34.50b	32.75b
No. 1 fine pale crepe, spot	33.00b	32.00b

Tendency: Very steady

CEYLON

No. 1 RSS

The price for No. 1 RSS Spot, at Colombo on October 26 was 135 (127) Ceylon cents per lb.

FBRAM Transport Meeting

The annual open meeting of the Federation of British Rubber and Allied Manufacturers' Transport Committee is to be held on November 12 at 2.30 p.m., at the Café Royal, London. The guest speaker on this occasion will be Mr F. J. W. Wagstaff, acting district passenger manager, London Midland Region, British Railways.

Companies in the industry are invited to send representatives to the meeting where they will have an opportunity of putting questions to Mr Wagstaff on passenger parcels delays and to the committee on general transport problems. Further particulars are available from the Federation at 43, Bedford Square, London, W.C.1.

J. S. Tidmus

Mr J. S. Tidmus, B.Sc., F.I.R.I., died on October 15. Mr Tidmus, who recently resigned through ill-health from the board of ITS Rubber Ltd., was also a director of Minibrix Ltd., and the Premo Rubber Co. Ltd., had devoted many years of service to the rubber industry. He read several papers before the I.R.I. and served for some time on the Technical Committee of the Rubber Sole and Heel Manufacturers' Association. At the funeral service at Petersfield on October 19, in addition to his wife and son, mourners included Sir Charles Colston, chairman of ITS Rubber Ltd. and Minibrix Ltd., and directors of the companies.

Mr Desmond Kirkness, managing director of the Universal Asbestos Manufacturing Co. Ltd., is visiting Moscow at the invitation of the Trade Delegation of the USSR. He left London on Monday October 26, and is spending six days in Russia.

Industry INTELLIGENCE

Technical Data

Negomel AL5 in PVC

Negomel AL5 is an efficient antistatic additive for PVC which functions also as a secondary plasticizer. Test results showing the behaviour of this additive in PVC compounds are presented in Technical Information—Rubber, PC/R.64, issued by the Polymer and Chemicals Service Department of I.C.I.

Three series of PVC compounds were used in the tests, as follows:—Series 1: PVC 100, DOP 50 and 0, 5 and 10 of Negomel AL5. Series 2: PVC 100, DOP 50 compared with PVC 100, DOP 45 and 10 of Negomel AL5. Series 3: PVC 100, TTP 50, DOP 50 compared with PVC 100, TTP 40, DOP 50 and 10 of Negomel AL5. The PVC used in the first two series was Corvic H65/33 and in the third series Corvic P65/47. Data are given for the hardness, tensile strength, modulus, low-temperature flexibility, and weight loss after seven days in air at 100°C. for all the compounds, and for the volume resistivity also of the compounds used in series (2) and (3). The test results show that the compounds containing Negomel AL5 differ from similar compounds not containing it in two respects, namely (a) the Negomel AL5 compounds have a much lower volume resistivity, and (b) they have better low-temperature flexibility. It may be possible to achieve an economy when compounding antistatic PVC by using Negomel AL5 in replacement of part of the plasticizer rather than simply as an addition.

Synpol SB Rubbers

Further to the announcement in *Industry Intelligence* in *RJIP*, September 5, individual technical data sheets have recently been issued for the following Synpols: 1006, 1061, 8151A, 8200, 8201A, 8253A, 8254A and 8255A. Synpols 1006 and 1061 are non-staining and non-discolouring hot polymers; Synpol 8151A is a carbon black masterbatch; Synpols 8200 and 8201A are oil-extended cold polymers; and Synpols 8253A, 8254A and 8255A are oil-extended carbon black masterbatches.

All data sheets contain figures for chemical properties and vulcanization test results as well as examples of applications for the particular Synpols. In addition, typical commercial recipes are given for light-coloured mechanical goods and air-cured proofing based on Synpol 1006 and for white hospital sheeting and non-black moulded soling based on Synpol 1061. Synpol 8200 has been specially designed to give exceptionally high resistance to discolouration and staining. It contains 37.5 parts of a light-coloured naphthenic oil per 100 parts of polymer while a non-staining, non-discolouring stabilizer in an amount of 1.25% has been added during manufacture. The data sheet for Synpol 8200 contains test results for colour properties and for discolouration by exposure to sunlight in California, the results indicating excellent behaviour of the polymer in these tests.

Calcium Silicates

Two calcium silicates, namely Microcal 160 and Microcal 210, have been compared with three other brands of calcium silicate in regard to their behaviour in rubber. Results of the comparison are reported in Progress Report No. 1 issued by Joseph Crosfield and Sons Ltd., Warrington, Lancs.

Two compounds were used, one based on natural rubber and containing 60 phr of calcium silicate and the other a resin rubber compound containing smoked sheet 40, high styrene resin 100 and calcium silicate 90 parts. All the vulcanizates were tested for tensile strength, elongation at break, modulus, tear strength and hardness. The resin rubber compounds were tested also for Mooney viscosity and Mooney scorch time while the resin rubber vulcanizates were tested additionally for compression set and tension set. The results show that Microcal 160 is similar to one of the other brands tested, while Microcal 210 is similar to the other two brands tested, although both the Microcals are more easily incorporated in the rubber on a laboratory roll mill than the other brands with which they are otherwise similar. Microcal 210 has the advantage of imparting by far the best compression set and tension set in the resin rubber compound of all the calcium silicates tested.

Machines, Materials and Equipment

Hand Rollers for Hand Laying Up

The advantage of a new range of rollers made by the Richard Maurice Equipment Co., Portsmouth Road, Cobham, Surrey, for hand laying up of laminated plastics is that they do not clog, since the spring incorporated is supported only at the ends. For cleaning, the spindle is withdrawn, and the spring is very easily cleaned and re-assembled. The spring roller imparts a slight sideways motion to the work, which assists in expelling air bubbles. The resilience of the straight spring makes it eminently suitable for convex surfaces, whilst barrel shaped springs are available for concave surfaces. The largest roller in the range is 4in. x 1½in. diameter, the smallest 2½in. x ⅞in. diameter. Four conventional split washers and rollers are included in the range, varying from 4in. x 1½in. diameter to 2in. x 1½in. diameter. One of these is barrel shaped for concave surfaces. All rollers have cadmium-plated steel frames, and plastic-covered handles. Prices are 15s. and 17s. 6d.; a full list is available from the maufacturers.

Publications Received

Neumo Pumps

The range of pumps manufactured by Neumo Ltd., South Coast Road, Peacehaven, Sussex, is described in a booklet, 'Why Neumo,' recently issued by the company. An interesting feature of these pumps, which are designed for use with any material that flows, is the company's own motor unit which represents a considerable advancement in pneumatic engineering. For many years, designers in this field have been endeavouring to perfect the simplest possible piston-type motor, i.e., a motor having a reciprocating piston controlled in its stroke by a reciprocating piston valve, which in turn would have its own stroke controlled by the piston. This would seem the ultimate in simplicity but a seemingly insurmountable barrier has prevented such a motor functioning satisfactorily. In the case of both piston and valve, in order to bring about change of direction, air pressures must be alternated from one end of the component to the other and this results in a rising pressure at one end at some point passing a falling pressure at the other. Naturally at this point, if there were not sufficient momentum present, with equal pressures at both ends the component would stall and remain locked in this position. Such lack of momentum would be evident if the motor were operating slowly or under load. Further, this position being the most likely one in which the motor would come to rest upon air being switched off, in a great number of cases, upon air being supplied the motor would refuse to function until the offending component had been physically moved from the dead position. A good example of this will be found in the common steam engine, where a similar slide valve system has been used for many years. A heavy flywheel is here employed to maintain momentum; and it is often necessary when it is applied, to physically move—by some means provided—the valve from its dead position in order to start the engine. In the 'Neumo' motor this dead position has been completely avoided and, no matter the position in which the valve or piston comes to rest, the motor will in all cases function normally immediately air is supplied.

Future Events

INSTITUTION OF THE RUBBER INDUSTRY

North Eastern Section.—Monday November 2 at the Eldon Grill, Grey Street, Newcastle, at 7 p.m. Film Evening by Bakelite Ltd.

South Wales and Monmouthshire Section.—Monday November 2 at the Royal Hotel, Cardiff, at 7.30 p.m. 'Natural Rubber Versus SBR,' by Mr K. G. Burridge, M.A., M.Ch.E., A.R.I.C., A.M.I.Chem.E. (International Synthetic Rubber Co. Ltd.).

Burton-on-Trent Section.—Monday November 2 at the Midland Hotel, Burton-on-Trent, at 7.30 p.m. 'Recent Advances in High Tensity Yarns,' and the film 'Best by Test,' by Mr E. V. Reeves, B.Sc., A.Inst.P. (Courtaulds Ltd.).

Merseyside Section.—Monday November 2 at the Exchange Hotel, Liverpool, at 7.15 p.m. 'The Work of the British Standards Institution in Relation to the Rubber Industry,' by Dr M. Glass (British Standards Institution).

Southern Section.—Wednesday November 4 at the Polygon Hotel, Southampton, at 7.30 p.m. 'The Manufacture of Carbon Black,' by Mr D. L. H. Allan, M.A. (Philblack Ltd.). In the chair, Mr D. S. White, A.I.R.I., chairman of the section.

Preston Section. — Monday November 9 at the BTR Industries Social Club, Farington, Preston, at 7.15 p.m. 'Recent Advances in High Tenacity Rayons,' by Mr G. A. Pittman, B.Sc. (Courtaulds) Ltd.

Midland Section.—Monday, November 9 at the Grand Hotel, Birmingham, at 6.45 p.m. 'Towards the Quantitative Understanding of Rubbers,' by Professor G. Gee, C.B.E., F.R.S. (Manchester University).

PLASTICS INSTITUTE

London and District Section.—Tuesday November 3 at the Wellcome Building, 183/193 Euston Road, London, N.W.1, at 6.30 p.m. 'Recent Advances in Synthetic Rubbers,' by Dr W. F. Watson (Research Association of British Rubber Manufacturers).

London and District Section.—Thursday November 5 at the Criterion, Piccadilly, London, W.1. Annual luncheon.

Plastics and Polymer Group, Society of Chemical Industry. — Tuesday November 3 at the SCI Meeting Room, 14 Belgrave Square, London, S.W.1. '"Delrin" Acetal Resin,' by Dr G. F. C. Barrett (Du Pont Company (UK) Ltd.).

Mr L. J. W. Bailey has succeeded Mr E. F. Hingeley as general manager of Dunlop (Germany). Mr Bailey, who joined Dunlop in 1937, was previously general manager of the India Tyre and Rubber Company.

NEW COMPANIES

Neurad Plastics Ltd. (629,099).—May 28. Capital: £10,000 in £1 shares. To carry on the business of manufacturers, moulders, prefabricators, producers, exporters and importers of and dealers in plastic and rubber fabrications, mouldings, injection mouldings, vacuum mouldings, etc. The permanent directors are: John R. Rothwell, director of Bolton Slippers Ltd., and Ian Rothwell, both of 101 Liverpool Road, Penwortham, Preston, and James Greenhalgh, Woodland, Preston New Road, Salmesbury, near Preston, director of Bolton Slippers Ltd. Regd. office: 60 Blackburn Road, Darwen, Lancs.

Sealants Ltd. (630,545).—June 17. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in sealing and jointing materials used or capable of being used in building and engineering construction, etc. The directors are: Harold R. Rose, Swallowfield, Limpsfield; Frank H. Bunce, 91 Pashley Road, Eastbourne. Regd. office: 3 Cloak Lane, London, E.C.4.

Homeward Products Ltd. (630,677).—June 18. Capital: £100 in £1 shares. To carry on the business of manufacturers of and wholesale and retail dealers in engineering and plastic products of all kinds, etc. The directors are: Leslie J. Pratt, 16 Manland Avenue, Harpenden, director of A. J. Pratt and Sons Ltd., etc., and Harold E. Holmes, 20 Douglas Road, Harpenden. Regd. office: Adam House, 1 Fitzroy Square, London, W.1.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

Patrn-Glaze

(777,412) For chemical compounds for use as coating compositions (not in the nature of paint) and synthetic resin compounds, all for use in imparting a glaze to building blocks in the course of manufacture. By the Burns and Russell Co. of Baltimore City, Bayard and Severn Streets, City of Baltimore, State of Maryland, USA. Address for service is c/o Stevens, Langner, Parry and Rollinson, 5 to 9 Quality Court, Chancery Lane, London, W.C.2. To be associated with No. 756,355 (4118, 615). (Class 1; September 16 1959.)

Third Annual Meeting of Scientific Societies

The Third Annual Meeting of Scientific Societies in South Wales and Monmouthshire, to be held on November 13, will be addressed this year by Sir Harry Melville, F.R.S., whose subject will be 'Research and Development in the DSIR Stations.' The meeting will be in the Reardon-Smith Lecture Theatre, National Museum of Wales, Cardiff. Admission will be by ticket only, obtainable from the secretaries of the local sections of the respective Scientific Societies or from the secretary, Co-ordinating Committee, Dr R. Rawlings, University College, Newport Road, Cardiff.

The Scientific Societies represented at the meeting will be Royal Institute of Chemistry, Institution of Chemical Engineers, Institute of Fuel, Institute of Metals, Institute of Petroleum, Institute of Physics, Institution of the Rubber Industry, Chemical Society, Plastics Institute, Textile Institute, Society of Analytical Chemists, Society of Chemical Industry, Society of Instrument Technology, Mathematical Society, Newport and District Metallurgical Society.

PATENT LIST

Printed copies of the Specifications in the following list, published by permission of the Controller of H.M. Stationary Office, can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage, but about six weeks after the date of this publication will usually elapse before they come available. Orders with remittance may be sent in advance to the Patent Office, and will be fulfilled immediately the Specifications are published.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on July 29 1959

Yorkshire Copper Works (Holdings) Ltd., formerly Yorkshire Copper Works Ltd. Thermoplastic pipe ends. 818,089.

British Industrial Plastics Ltd. Thermosetting aminoplastic moulding compositions. 818,044.

Velsicol Chemical Corporation. Fire and heat resistant cellular plastic compositions and process for preparing same. 818,330.

E. Scragg and Sons Ltd. False-twisting of synthetic thermoplastic textile filaments, threads and yarns. 818,012.

Farbenfabriken Bayer A.G. Process for the production of cured epoxide resins. 818,218.

Petrochemicals Ltd. Production of polymerization catalysts and of polythenes. 818,308.

Dow Chemical Co. Method for expanding into a foam structure thermoplastic resin and articles thereby obtained. 818,097.

Imperial Chemical Industries Ltd. Melt spinning of polypropylene. 818,100.

Imperial Chemical Industries Ltd. Vulcanizable compositions. 818,285.

Rubber Journal and International Plastics CLASSIFIED ADVERTISEMENTS

APPOINTMENTS VACANT

6d. a word, Minimum 10/-. Box 2/-.

APPLICATIONS are invited by The Sutcliffe Moulded Rubber Company Limited for the position of works manager. The post carries responsibility for production planning, control and methods development, materials control, and for mixing, calendering, extruding, moulding, and roller-covering plants. Applicants should be 27 to 35 years of age, should preferably have a University degree or a diploma in rubber and plastics technology, and should have experience in factory management, modern production techniques and incentive schemes. Remuneration will be dependent upon qualifications and experience but will not be less than £1,500 p.a., plus pension scheme and other benefits. The company is one of a progressive group and provides excellent prospects.—Applications, which will be treated in confidence, should set out details of age, education, qualifications and experience, and should be addressed to The General Manager, Church Street, Ossett, Yorkshire. (278)

CHEMIST required with experience in compounding natural and synthetics and of process control. Several years' experience and A.I.R.I. or equivalent preferred.—Applications marked confidential should give full details of education and experience, to Managing Director, Long and Hambly, High Wycombe, Bucks. (240)

QUALIFIED chemist required for fabric proofing. Responsibilities will include process control and laboratory research and development in new fields of enquiry in this branch of the textile industry.—Applications giving full personal details and all relevant information regarding qualifications and experience to the Secretary, Kagan Textiles Limited, Gannex Mills, Elland, Yorkshire. Phone: Elland 3371/4. (284)

REQUIRED a general works manager for a proofing plant in the Belfast area. Applicants must be highly experienced in all branches of proofing textiles with rubber, neoprene and PVC. This is a senior appointment with a large textile organization, carrying a salary of £1,500 but more would be paid to a man having exceptional qualifications. Superannuation scheme, and assistance in removal expenses would be paid. Age range 35-45. Apply in complete confidence stating past experience and present employers. Applicants could be interviewed in Manchester.—Box 261. (261)

CABOT CARBON LIMITED

Rubber Technologist

Arising from the expansion of activities throughout Europe, Cabot Carbon Limited is seeking the services of a rubber technologist for its technical department at Stanlow, Ellesmere Port. The successful applicant will be required to assist the technical manager in handling technical service projects, in planning and preparing technical bulletins for publication and in establishing and maintaining technical liaison with customers. Personality, initiative and the ability to originate and carry through to completion investigations covering a wide field of applications are essential requirements. The qualifications looked for are an A.I.R.I. together with three years minimum practical rubber experience or alternatively extended rubber compounding experience, and a knowledge of plastics technology would be an added advantage. A generous commencing salary will be offered in line with the responsibilities of the position and the Company operates a non-contributory superannuation and life assurance scheme.—Applications giving full details of age, qualifications, past experience and expected salary should be made in confidence to the Technical Manager, Cabot Carbon Limited, Stanlow, Ellesmere Port, Cheshire. (281)

APPOINTMENTS VACANT (continued)

SALES manager required for Manchester rubber com employing 250 work people, and at present sup general industrial mouldings, the footwear industry, and hold goods. Excellent prospects for energetic man with commercial knowledge to take over expanding sales org tion.—Send full particulars of experience, present positi approximate salary required to Box 255.

SCOTTISH company planning expansion requires experi chemist/technologist for production quality control. salary and wide scope for man of initiative. Removal e paid.—Box 272.

SCOTLAND. Chemist/technologist, national certi standard, aged 20-25 years, required for production qu control. Good salary and wide scope for energetic young m expanding company.—Box 265.

SPECIFICATION clerk (male) preferably with some pr experience in all stages of the manufacture of rubber p required. Superannuation and life assurance scheme. Five week.—Apply stating age, experience and salary requir Andre Rubber Co. Ltd., Hook Rise, Kingston By-Pass, Sur Surrey.

BTR

Arising from Promotion, Relocation or Retirement, t vacancies exist and in each case may be expected to prov opportunities for advancement, either at the same location o by subsequent transfer within the BTR Group.

Whilst we are looking for men (age 25-40) with A.I.R. A.P.I., H.N.C., or of degree standard, preferably with so experience, we will also consider young men who wish to obt higher qualifications by part-time study.

BURTON-ON-TRENT

PHYSICIST/CHEMIST (Ref. BPT) to take charg of test laboratories.

RUBBER TECHNOLOGIST (Ref. DCB) to carr out DEVELOPMENT work on new, also established, pr ducts from a wide range.

LEYLAND

RUBBER TECHNOLOGISTS (Ref. LT) f process control and product development of INFLATABLE EQUIPMENT: also HOSE, CONVEYOR BELTING o other industrial products.

LONDON

DEVELOPMENT DESIGNER (Ref. HPH/D) t design HOSE COUPLINGS and assemblies for HY-DRAULIC and PNEUMATIC applications.

RUBBER TECHNOLOGISTS (Ref. SRT) f compounding, process control and product development o EBONITE, MOULDED MECHANICALS or ROLLER COVERINGS.

MOULD DESIGNER (Ref. SMD) to be responsible for design and manufacture of moulds and dies for rubber ebonite and plastic processes.

Applications, which will be treated in strict confidence, should include tabulated details of education, experience, etc., and advertisement reference. Send to:—

The Group Personnel Officer
BTR INDUSTRIES LTD.
Herga House, Vincent Square, London, S.W.1 (177)

ARTICLES WANTED

6d. a word, Minimum 12/6 Box 2/-

WANTED. Condux toothed disc mill, model HZ 8, in g condition.—Details to Box 274.

4½IN. RUBBER extruder required complete with electri equipment. Not more than 5-7 years' old. Very urg State particulars and price.—Box 279.